GEORGIA TECH GT–VIAG
VLSI DESIGN VERIFICATION DOCUMENT

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COMPUTER ENGINEERING RESEARCH LABORATORY

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Atlanta, Georgia 30332–0540

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INTRODUCTION

There are eleven (11) Georgia Tech VLSI designs (see Table 1) in the AHAT Program. Each of these designs has been produced by Georgia Tech using the Genesil Silicon Compiler. Each design has passed the design verification process at Silicon Compiler Systems / Mentor Graphics and each has been fabricated in a bulk CMOS process (fabrication of certain chips was not complete when this document was released). Each of the Georgia Tech designs listed in Table 1 is being delivered to USASDC and to the Harris Corporation for conversion and fabrication in a rad–hard process. The program under which this work is done is AHAT (Advanced Hardened Avionics Technology). This document includes design information for the Georgia Tech instruction address generation chip, GT–VIAG.

Table 1. Georgia Tech Chip Set for AHAT

Design	DV Passed	Tape Delivered	Fabricated	Tested
GT–VFPU/1A	1/17/89	8/3/90	5/19/89	4/4/90
GT–VNUC				
GT–VTF				
GT–VTHR	12/11/90	2/15/91	3/1/91	
GT–VCLS	1/26/90	7/12/90	7/13/90	
GT–VCTR	2/8/90	7/12/90	7/13/90	
GT–VIAG	3/8/91	3/11/91		
GT–VDAG	2/22/91	2/25/91		
GT–VSNI	1/17/89	5/23/90	4/14/89	4/4/90
GT–VSM8	1/17/89	6/8/90	5/6/89	4/4/90
GT–VSF	9/12/89	7/19/90	7/13/90	

GT–VIAG : Instruction Address Generation Chip

1. Design Verification Checklist

The DV checklist attached in Appendix A.

2. Functional Description

This section describes briefly the function of the chip and the modules at core level.

2.1. Module boot_mod

Functional Description

The "boot rom" code that contains the instructions that are executed when IAG is in a bootstrap mode is actually implemented in a PLA named "boot_pla". There is additional hardware that checks for the boot pattern whenever the instruction address (Pc) is zero. If the special pattern is not detected, the chip enters a bootstrap mode that enables it to load instruction and data memory from I/O device 3.

2.2. Module inst_mod

Functional Description

This module serves two main purposes. First, all instructions are funneled through this module, so that boot instructions can be substituted during the booting process. (I/O instructions are multiplexed in io_mod.) This also permits halting the instruction pipeline under certain circumstances using the "guard" signal. Second, another datapath contians the instruction registers. These are used to sample a single word of instruction memory or to write out a single word of instruction memory. This supports bootstrap loading, for example, by loading the registers from the network and then writing out the word after all the data has been received. Extra hardware controls the reading and writing process (so that, for example, an instruction that is sampled is not executed).

2.3. Module intr_mod

Functional Description

This module maintains the interrupt vector table, detects and prioritizes interrupt conditions, and determines whether and which interrupt to execute. The interrupt vector table is a RAM block, and it contains a single 26–bit destination address for each of the 16 possible interrupt conditions. The interrupt detection logic includes disabled and non–disabled interrupt registers and an "interrupt enable" flag that enables maskable interrupts. The "valid_intr_mod" takes into account the priority of the interrupt currently being serviced. If a higher priority interrupt occurs, it pushes the current interrupt onto its own internal hardware stack. All interrupt stack operations can only use the hardware stack.

2.4. Module io_mod

Functional Description

This module controls the input and output operations of the chipset. It identifies which I/O device should be active, whether the unit is in an input or output mode, and checks to make sure the I/O

device has completed the indicated operation. Besides much glue logic, it contains four separate modules to control synchronous and asynchronous input and output. These modules include PLA–based state machines to control handshaking.

2.5. Module lcntr_mod

Functional Description

This module contains the special–purpose loop counter and hardware to load, store, increment, and test it for zero. It can be loaded and stored directly or by using the "Begin Loop" and "End Loop" instructions. If the counter is non–zero when a "Begin Loop" is executed, the current loop counter value is pushed onto the stack. This supports nested loops.

2.6. Module pc_gen_mod

This module controls the Pc. It also contains the pc register, "BPP" control hardware, and the hardware stack and associated support.

Many modules are used to determine the next Pc. There are various kinds of branch conditions which can come from a wide variety of sources. (See the programming specification for more details.) Two modules, brpend_ctrl and flush_ctrl, detect and create a "flush" condtion, which occurs when the wrong condition was chosen for a conditional branch. One module, "bradr_pla" accepts the raw instruction inputs and interrupt condition to determine the source of the next address. "pc_ndp_mod" uses this information to control the multiplexers, and it keeps track of the flush destination and can increment the Pc. The pc register is used for "external" branches and for instruction reading and writing. It contains an "autoincrement" to support writing to adjacent memory locations. The "BPP" hardware supports the BPP opcode by maintaining the BPP register and controlling whether the chip is in the BPP mode. Finally, additional hardware supports the hardware stack by controlling the source of the push, containing the necessary 32 deep by 27 bit wide RAM, and maintaining the stack pointer.

2.7. Module pc_st_mod

This module multiplexes the "pc_gen_mod" read out bus ("br_adr") with the loop counter. This is needed because loop counter instructions are part of so–called "pc_ld" and "pc_st" instructions.

2.8. Module r_out_mod

Functional Description

This module contains several multiplexers which control which part of the chip is being read out over the data (RF) bus. The control logic controls the selection.

2.9. Module rf_din_mod

Functional Description

This module controls the "f_r_1" bus, which is used for loading registers. It can drive the bus with the R bus one cycle before, the F bus one or two cycles before, or the value "0". The latter is used at reset to simultaneously reset most registers. The selection is based on the booting signal and the operand dependency checking signals. (See the documentation for DAG for a description of these.)

2.10. Module status_mod

Functional Description

This module checks for kernel instructions being executed in the user mode, maintains and flags any error conditions that occur, and contains a special–purpose status register that can be loaded with either error information or intterupt servicing information.

2.11. Module task_ptr_mod

Functional Description

This module contains the "task pointer" and "task pointer limit" registers. These are used when IAG is in the "user" mode to define an allowable range of instruction addresses. The task pointer is added in to every instruction address while in the user mode. (This adder is in pc_gen_mod.) Additional logic in this module controls whether the chip is in user or kernel mode.

2.12. Module timer_mod

Functional Description

This module contains two "timers", which are actually 16–bit counters. There are registers that control the starting value of the two count–up counters. A carry–out from either timer is flagged as an interrupt.

2.13. Instruction decoder modules (5 random logic blocks)

Functional Description

There are five random logic blocks that carry out some of the instruction decoding. (Some additional decoding is performed by the individual modules listed above.) The five modules are pc_maj_dec, MISC_dec, LD_dec, ST_dec, and inst_en. The first four are somewhat hierarchical, in that one signal from one enables the next.

3. Signal Descriptions

3.1. Inputs

A description of the inputs and outputs to the IAG are described below. All signals are active high except those that start with "N_".

Name	Timing	From	Purpose
ALU_flag	SB(t)	ALU	Undesignated ALU flag.
Carry	SB(t)	ALU	Carry flag from the ALU.
Clk	N/A	Ext.	Provides clocking control to the chip.
DAG_error	VB(t)	DAG	Indicates that an error has occurred at the GT–VDAG chip.
DAV[3:1]	VB(t)	I/O	Input device ready for I/O devices 1 to 3
IAG_test[1:0]	VB(t)	Ext.	Test pins that manually control "freeze" and "guard" modes on IAG to permit non–destructive state readout
Inst_rdy	VB(t)	Inst. Mem.	Instruction ready line. If this line is low, the next instruction executed will be a nop. (That is, the instruction will be disregarded.)

Intr[8:0]	VB(t)	Ext.	9 external interrupt signals.
N_reset	VB(t)	Ext.	Active low external reset line for the GT–VIAG chip.
Pixel_clk	VB(t)	Ext.	Clock for SP chips—used as data input for IAG to compute Ios signal which controls SP I/O
RFI[3:1]	VA(t)	I/O	Output device ready for I/O devices 1 to 3
R_eq_f_1	VB(t)	DAG	Status for R_adr[25:0] equals to F_adr_1[25:0]
R_eq_f_2	VB(t)	DAG	Status for R_adr[25:0] equals to F_adr_2[25:0]
Sign	SB(t)	ALU	Sign flag from the ALU.
Status[4:0]	VB(t)	Ext.	Five external status lines that can be used as branch conditions.
S_eq_f_1	VB(t)	DAG	Status for S_adr[25:0] equals to F_adr_1[25:0]
S_eq_f_2	VB(t)	DAG	Status for S_adr[25:0] equals to F_adr_2[25:0]
Zero	SB(t)	ALU	Zero flag from the ALU.

3.2. Outputs

The primary destination is listed below. All signals are active high except those that start with "N_".

Name	Timing	To	Purpose
ALU_opcode[7:0]	SB(t)	ALU	Opcodes to control the operation of the ALU.
Booting	SB(t)	DAG	Indicates GT–EP chipset has entered a bootstrap mode.
DAG_R_en	SB(t)	DAG	R–bus enable line for the GT–VDAG chip.
Flush	VB(t)	EP	Indicates that a wrong execution path has been taken and that all pipeline registers need to be flushed.
Freeze	VB(t)	EP	Indicates that instruction execution is temporarily suspended.
Guard	VB(t)	DAG	Hallts loading of new instructions into instruction pipe.
Ids_eq_ods_1/2	SB(t)	DAG	Compares current Ids[3:0] with Ods[3:0] from one and two cycles ago. Used for operand dependency checking on GT–VDAG.
Ids_freeze	SB(t)	DAG	Indicates an input operation has blocked.
Ids_sel	WB(t)	ALU,I/O	Active high signal indicating that the GT–VIAG I/O is in the input mode. This signal is the inverse of the Ods_sel signal.
Inst_en	SB(t)	DAG	Activates output drivers on instruction lines on GT–VDAG chip; used to load instruction memory.
Inst_rd	SB(t)	DAG	Instruct the GT–VDAG chip to read the value on the instruction data bus into its instruction registers.
Ios	SB(t)	I/O	SP I/O interface control signal that prevents two asyncronous I/O events from happening in one Pixel_clk phase.

Kernel_mode	SB(t)	DAG	Indicates that instruction execution is currently in kernel mode.
Ncs[3:1]	W(t)	I/O	Active low chip selects for I/O devices 1 to 3.
N_cs_pha	VA(t)	Inst. Mem.	Chip select for the instruction memory that is accessed on PHASE_A.
N_cs_phb	VB(t)	Inst. Mem.	Chip select for the instruction memory that is accessed on PHASE_B.
N_inst_wr	VA(t)	Inst. Mem.	Write signal line for the instruction memory.
N_read[1]	VB(t)	I/O	Active low read signal for device 1.
N_reset_out	SB(t)	EP	Reset signal that includes hard reset and soft reset.
N_write[1]	VA(t)	I/O	Active low write signal for device 1.
Ods_freeze	SB(t)	DAG	Indicates an output operation has blocked.
Ods_ids[3:0]	W(t)	I/O	Multiplexed input and output device select lines.
Ods_sel	WA(t)	I/O	Active high signal indicating that the GT–VIAG I/O is in the output mode.
Pc[25:0]	SA(t)	Inst. Mem.	Program counter used to fetch the next instruction fields.
Read[3:2]	VB(t)	I/O	Active high read signals for devices 2 and 3.
Valid_intr_pulse	SB(t)	DAG	Instruct the GT–VDAG chip to cancel the execution of the current instruction because an interrupt has occurred.
Write[3:2]	VA(t)	I/O	Active high write signals for devices 2 and 3.

3.3. Bidirectional

Name	Timing	From/To	Purpose
Dr	W(t)	I/O	This signal stands for the active low device ready status line. If no I/O device is being accessed, IAG drives the line high.
Inst[45:0]	VB(t)/SA(t)	Inst. Mem.	Bi–directional instruction fields.
RF[31:0]	VB(t)/VB(t)	I/O,EP	Bidirectional data bus used to funnel information in and out of the GT–VIAG chip.

Table 3.1 Pin Summary Table

4. Final Notes

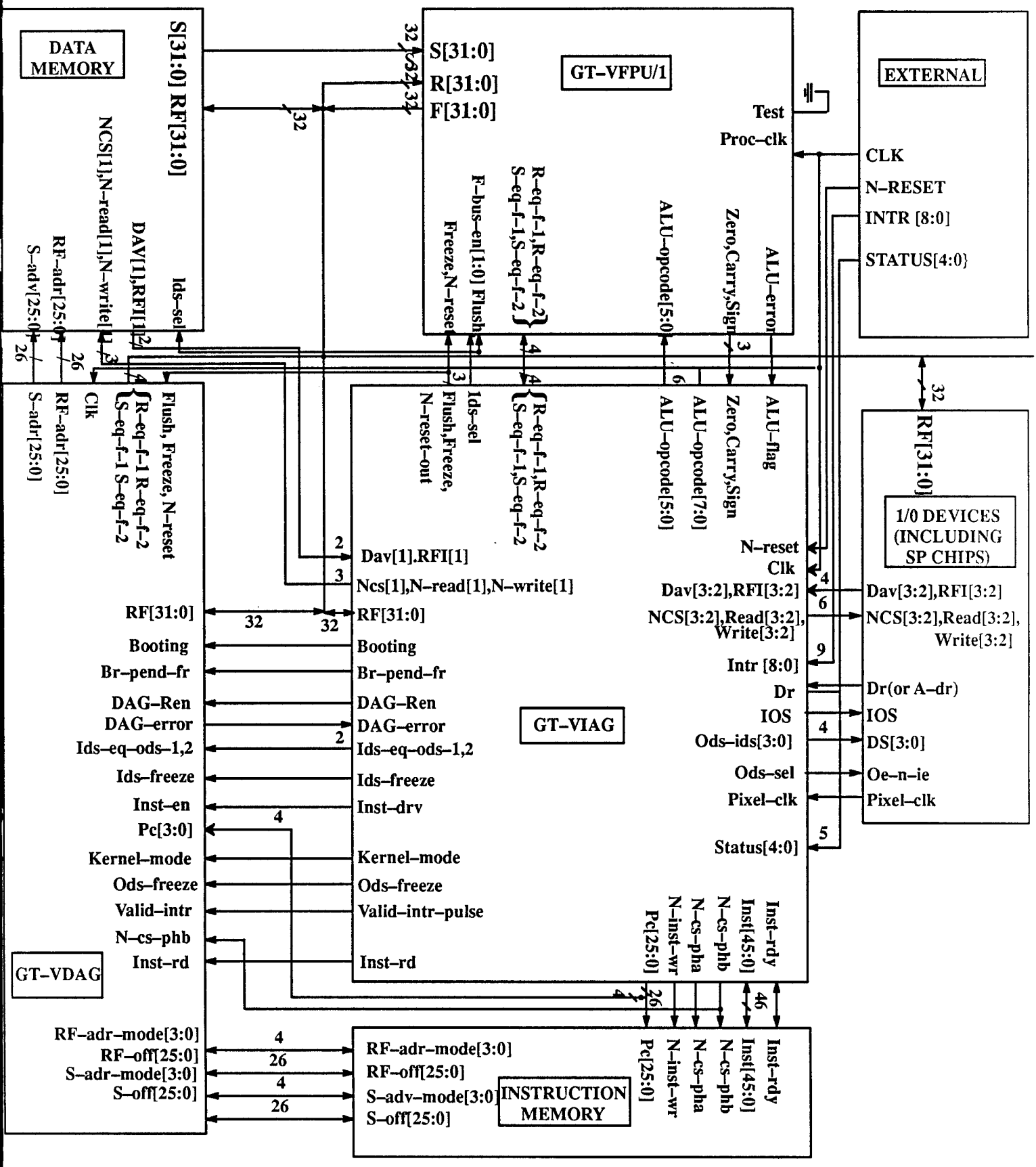
The chip required minor modifications during DV. There were two reasons for this. First, the chip power and ground router was not behaving properly, and so some of the rails needed widening. Second, the "bradr_pla" found in pc_gen_mod grew significantly larger because Mentor Graphics

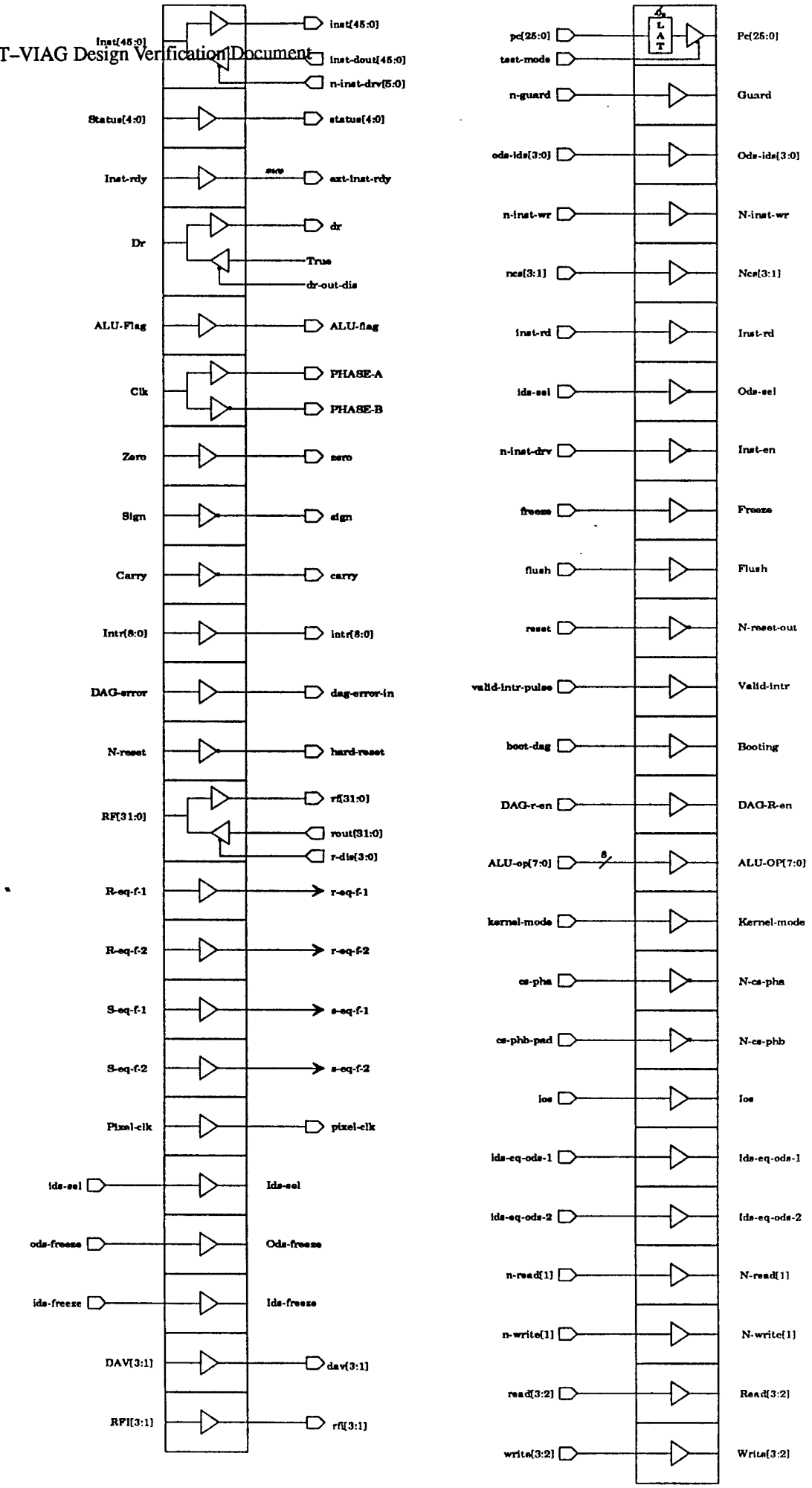
was using a later release of their logic compiler software. This had a direct impact on chip size. The power and ground rail problem was fixed and the logic compiler blocks were set to optimize slitghtly differently. The final chip size is 411 mils by 427 mils, and the cycle time (75 degrees C, 5.0V, Typical) is 91.8 ns.

NOTE: Instructions for recovering the DV database from the tape should be enclosed with the tape itself.

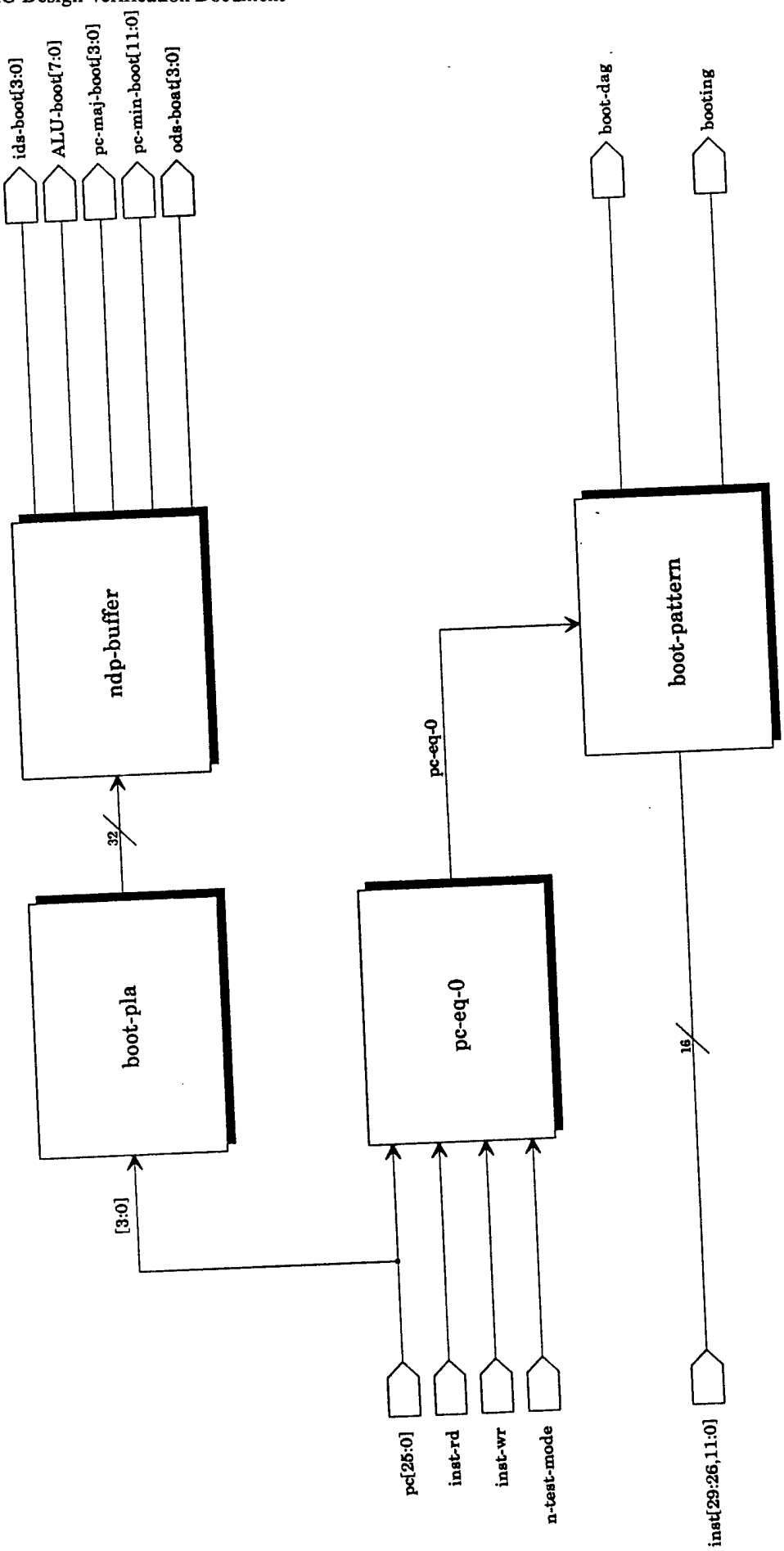
5. Block Diagrams and Schematics

The following is a series of schematics that describe the hardware of GT–VIAG and its part in the EP chipset. This section begins with a diagram of how GT–VIAG and GT–VDAG fit together in a complete system.


DATA MEMORY
S[31:0] RF[31:0]
NCS[1],N–read[1],N–write[1]
DAV[1],RFI[1]
Ids–sel
S–adv[25:0]
RF–adr[25:0]
S–adr[25:0]
Clk
R–eq–f–1 R–eq–f–2
S–eq–f–1 S–eq–f–2
Flush, Freeze, N–reset
GT–VFPU/1
S[31:0]
R[31:0]
F[31:0]
Test
Proc–clk
F–bus–en[1:0] Flush
Freeze,N–reset
R–eq–f–1,R–eq–f–2
S–eq–f–1,S–eq–f–2
ALU–opcode[5:0]
Zero,Carry,Sign
ALU–error
EXTERNAL
CLK
N–RESET
INTR [8:0]
STATUS[4:0}
RF[31:0]
1/0 DEVICES (INCLUDING SP CHIPS)
Dav[3:2],RFI[3:2]
NCS[3:2],Read[3:2], Write[3:2]
Dr(or A–dr)
IOS
DS[3:0]
Oe–n–ie
Pixel–clk
Flush,Freeze, N–reset
Ids–sel
ALU–opcode[7:0]
ALU–flag
Dav[1].RFI[1]
Ncs[1],N–read[1],N–write[1]
N–reset
Clk
Booting
Br–pend–fr
DAG–Ren
DAG–error
Ids–eq–ods–1,2
Ids–freeze
Inst–en
Inst–drv
Pc[3:0]
Kernel–mode
Ods–freeze
Valid–intr
Valid–intr–pulse
N–cs–phb
Inst–rd
Intr [8:0]
Ods–ids[3:0]
Ods–sel
Pixel–clk
Status[4:0]
GT–VIAG
GT–VDAG
Inst–rdy
Inst[45:0]
N–cs–phb
N–cs–pha
N–inst–wr
Pc[25:0]
RF–adr–mode[3:0]
RF–off[25:0]
S–adr–mode[3:0]
S–off[25:0]
S–adv–mode[3:0]
INSTRUCTION MEMORY

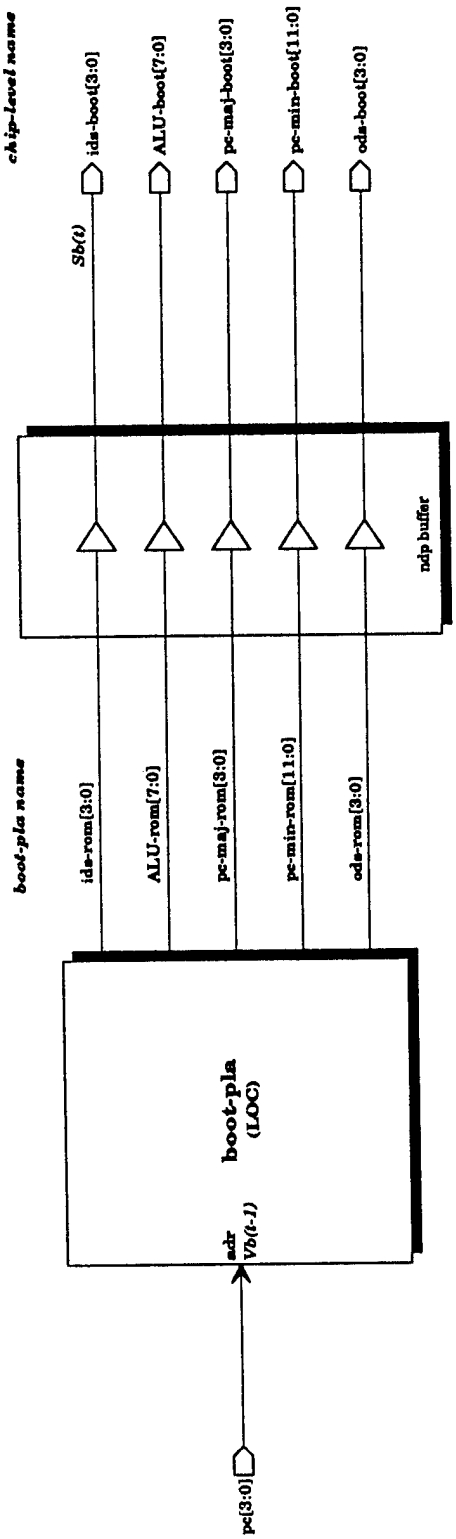

Inst[45:0]
inst[45:0]
inst-dout[45:0]
n-inst-drv[5:0]
Status[4:0]
status[4:0]
Inst-rdy
save
ext-inst-rdy
Dr
dr
True
dr-out-dis
ALU-Flag
ALU-flag
Clk
PHASE-A
PHASE-B
Zero
zero
Sign
sign
Carry
carry
Intr[8:0]
intr[8:0]
DAG-error
dag-error-in
N-reset
hard-reset
RF[31:0]
rf[31:0]
rout[31:0]
r-dis[3:0]
R-eq-f-1
r-eq-f-1
R-eq-f-2
r-eq-f-2
S-eq-f-1
s-eq-f-1
S-eq-f-2
s-eq-f-2
Pixel-clk
pixel-clk
ids-sel
Ids-sel
ods-freeze
Ods-freeze
ids-freeze
Ids-freeze
DAV[3:1]
dav[3:1]
RFI[3:1]
rfi[3:1]
pc[25:0]
test-mode
LAT
Pc[25:0]
n-guard
Guard
ods-ids[3:0]
Ods-ids[3:0]
n-inst-wr
N-inst-wr
ncs[3:1]
Ncs[3:1]
inst-rd
Inst-rd
ids-sel
Ods-sel
n-inst-drv
Inst-en
freeze
Freeze
flush
Flush
reset
N-reset-out
valid-intr-pulse
Valid-intr
boot-dag
Booting
DAG-r-en
DAG-R-en
ALU-op[7:0]
8
ALU-OP[7:0]
kernel-mode
Kernel-mode
cs-pha
N-cs-pha
cs-phb-pad
N-cs-phb
ios
Ios
ids-eq-ods-1
Ids-eq-ods-1
ids-eq-ods-2
Ids-eq-ods-2
n-read[1]
N-read[1]
n-write[1]
N-write[1]
read[3:2]
Read[3:2]
write[3:2]
Write[3:2]

I/O pads

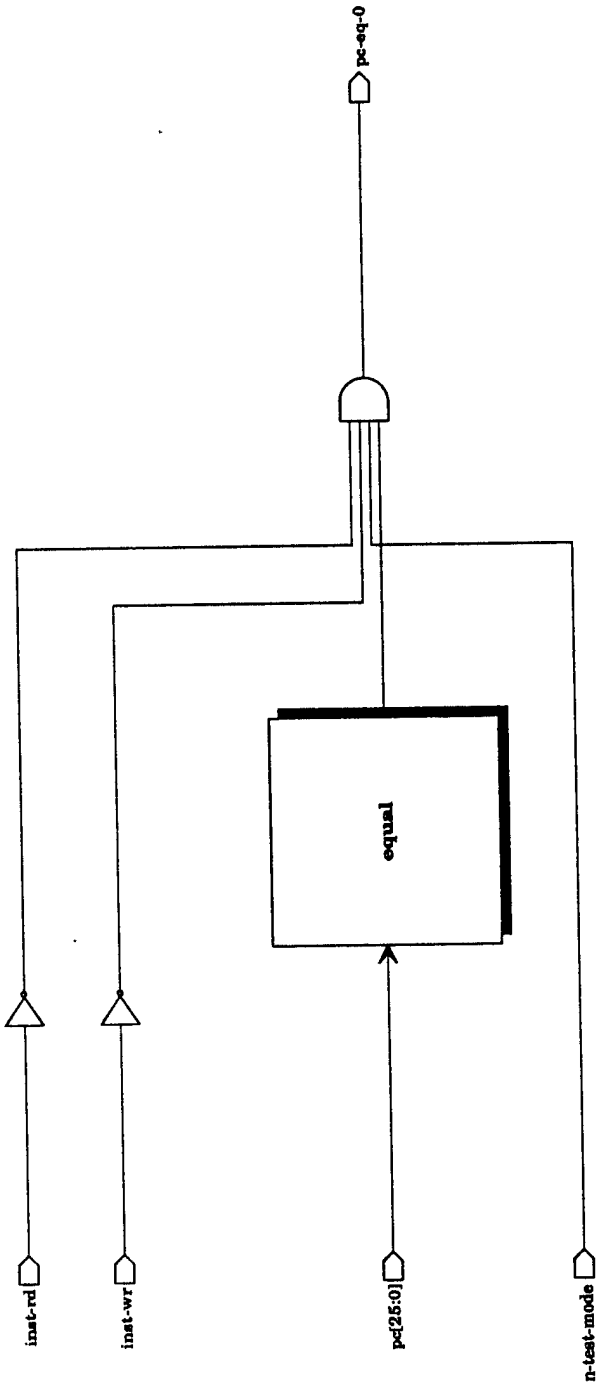

ids-boot[3:0]
ALU-boot[7:0]
pc-maj-boot[3:0]
pc-min-boot[11:0]
ods-boat[3:0]
boot-dag
booting
ndp-buffer
boot-pattern
32
pc-eq-0
boot-pla
pc-eq-0
16
[3:0]
pc[25:0]
inst-rd
inst-wr
n-test-mode
inst[29:26,11:0]

boot-mod

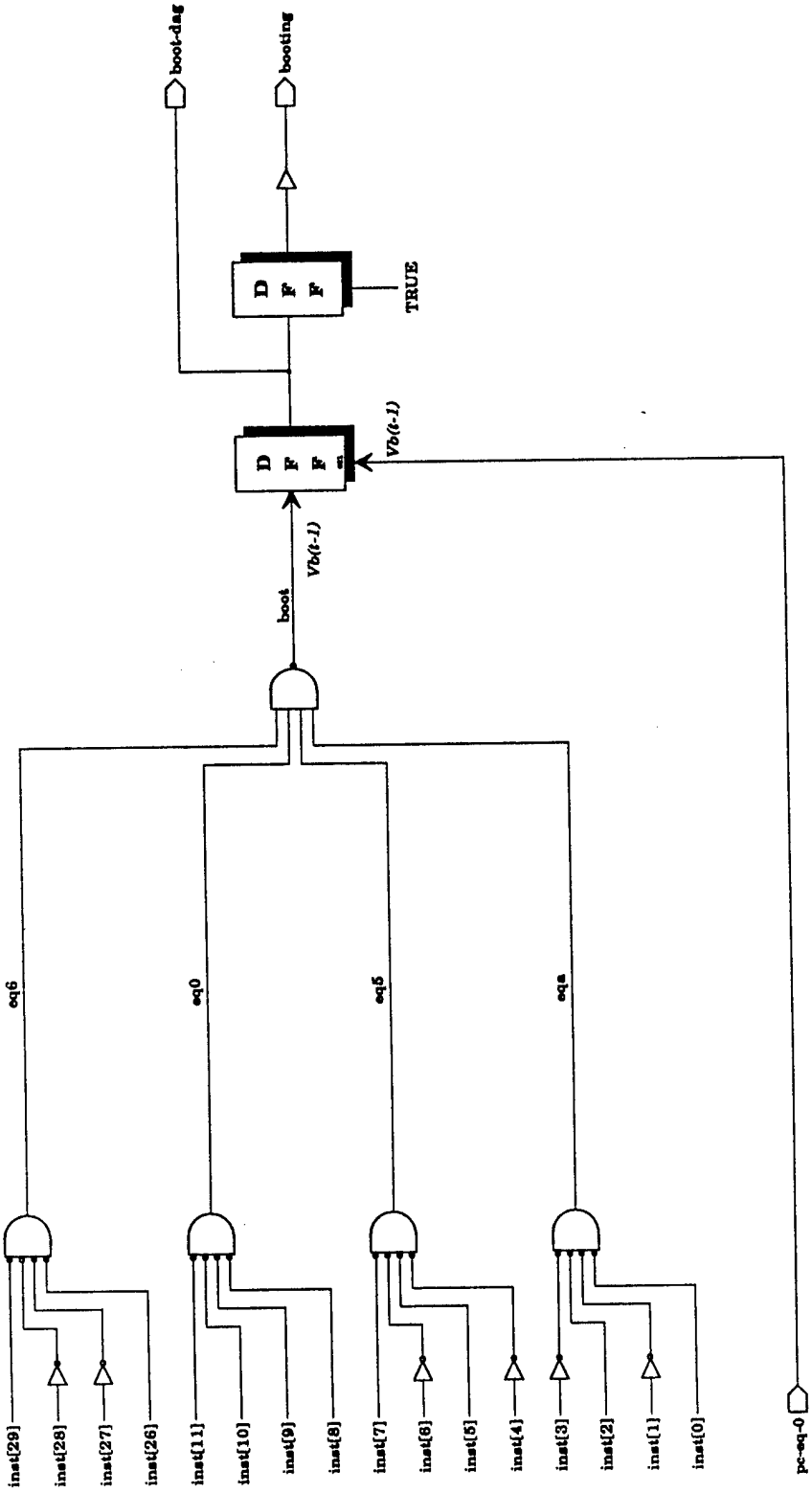
v:\gt-viag\boot-pla.drw



boot-pla

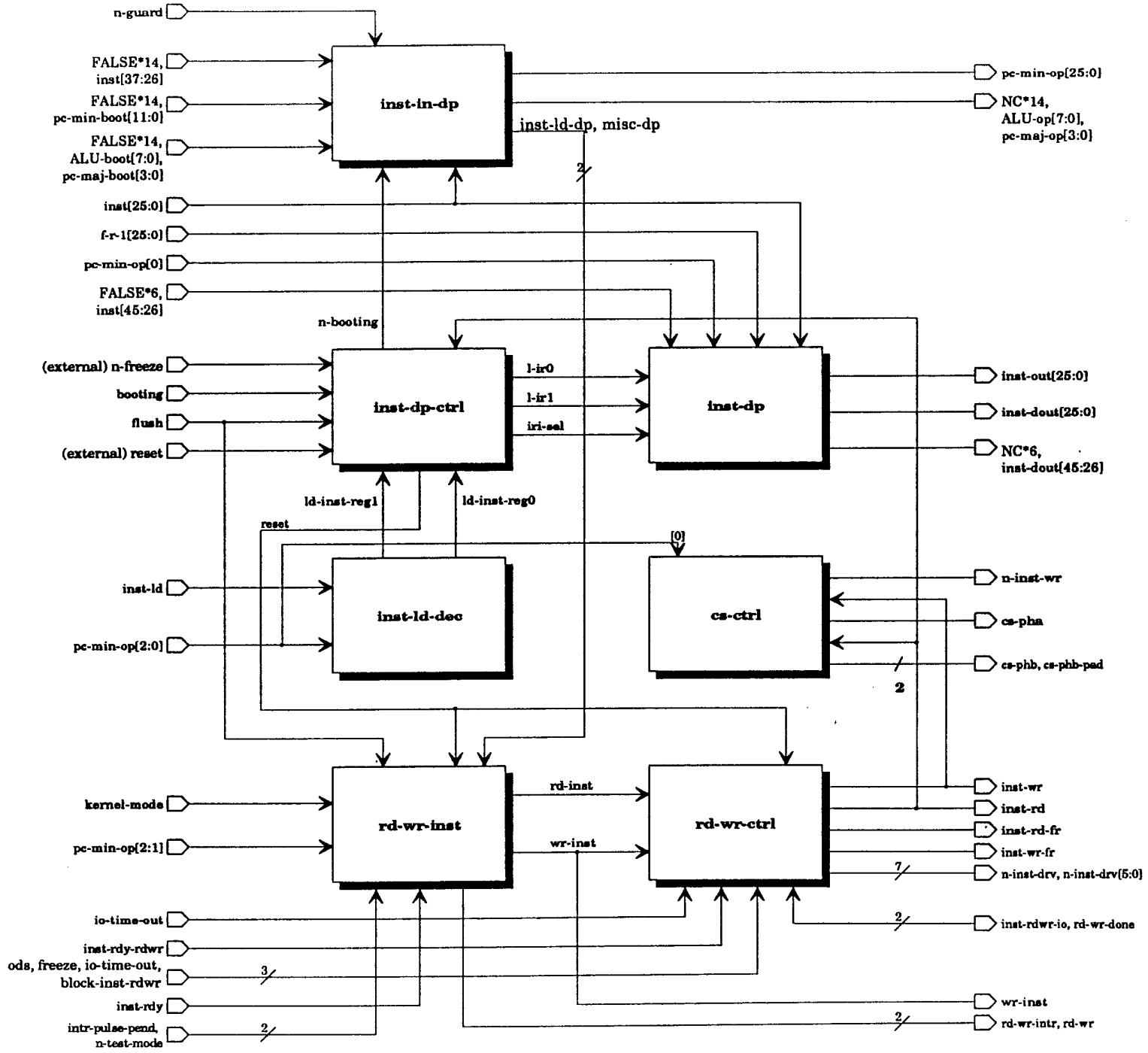


pc-eq-0



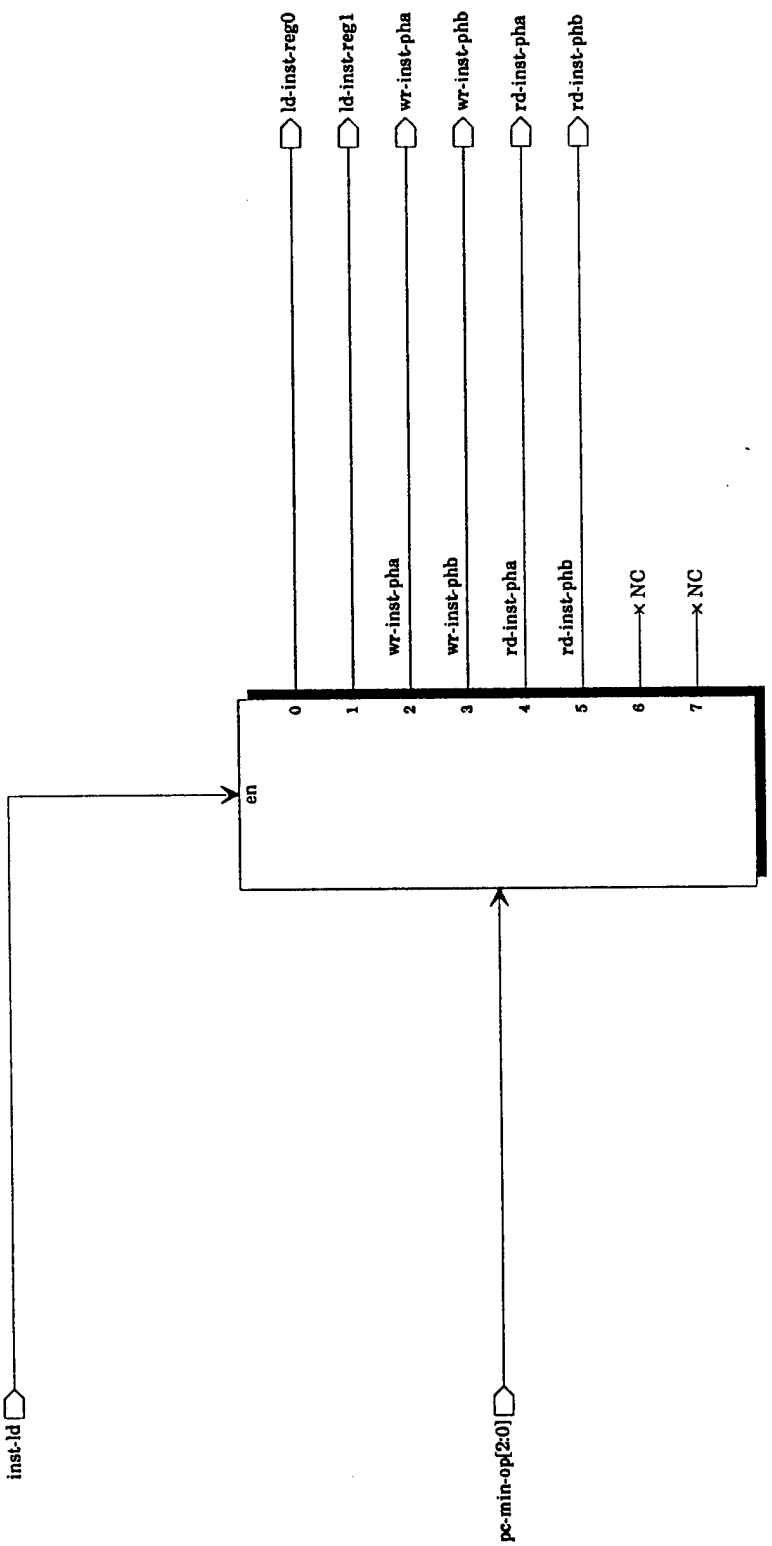
boot-pattern

v:\gt-viag\boot-pat.drw

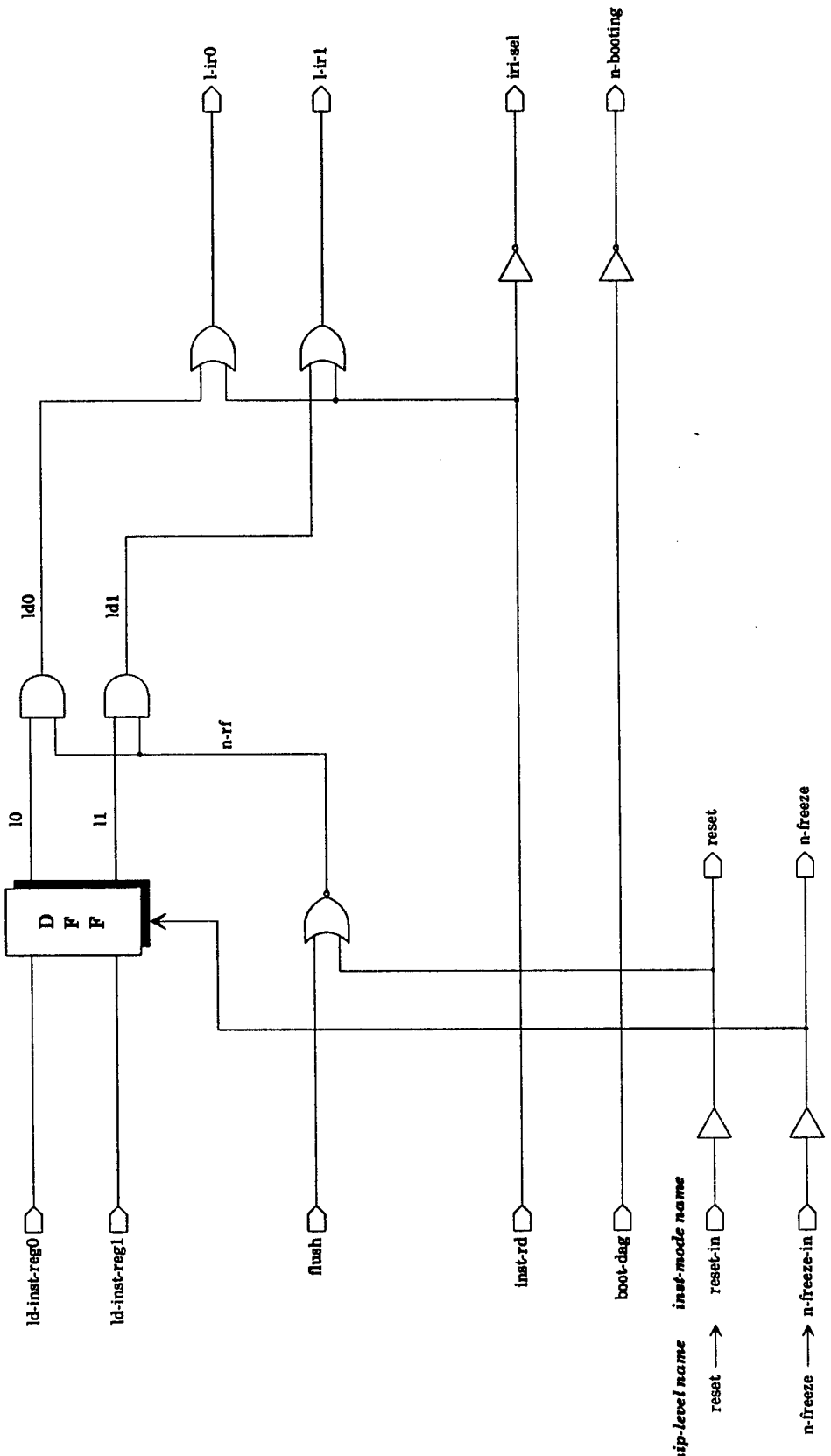


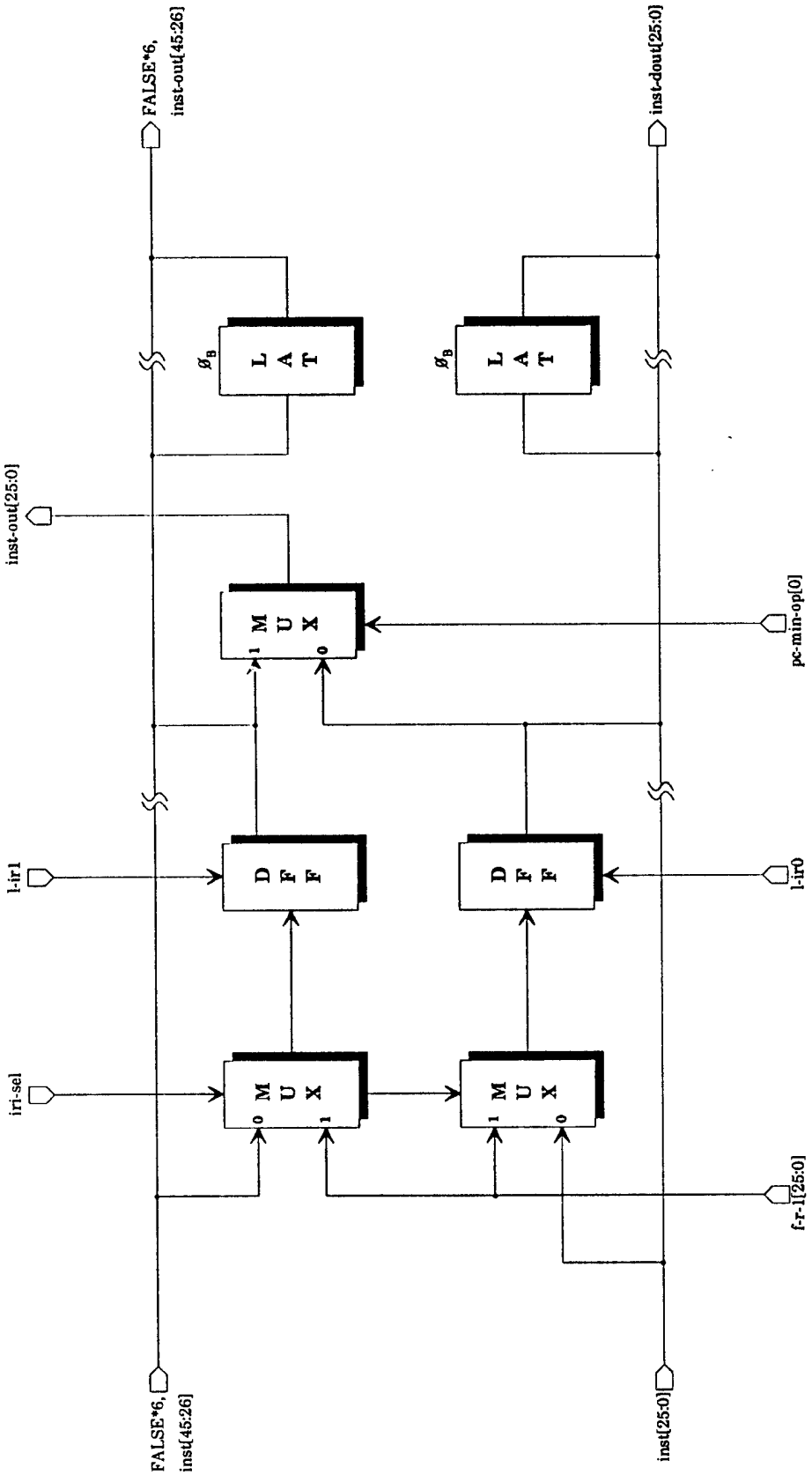
inst-mod

v:\gt-viag\inst-mod.drw


ld-inst-reg0
ld-inst-reg1
wr-inst-pha
wr-inst-phb
rd-inst-pha
rd-inst-phb
wr-inst-pha
wr-inst-phb
rd-inst-pha
rd-inst-phb
NC
NC
0
1
2
3
4
5
6
7
en
inst-ld
pc-min-op[2:0]

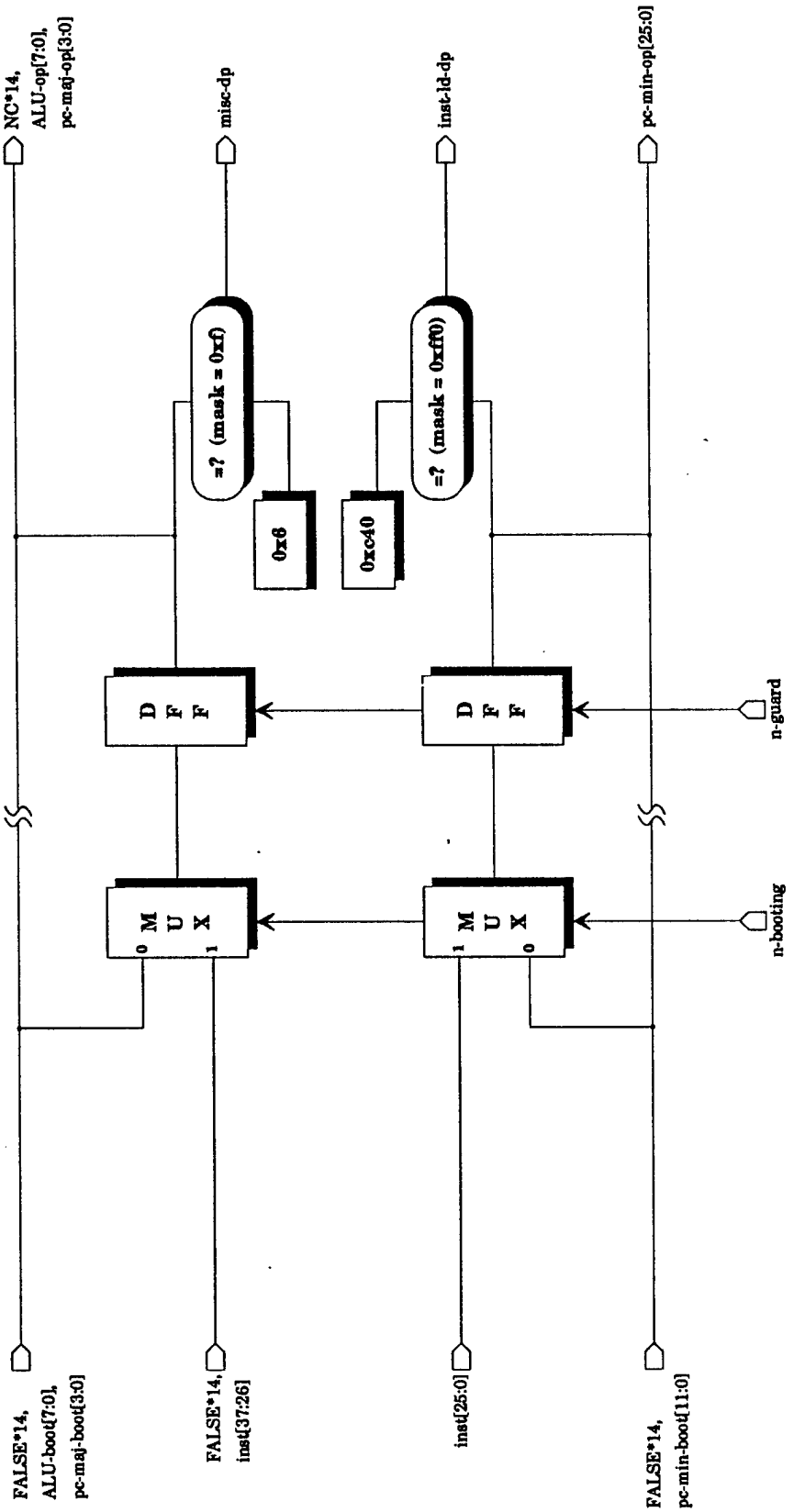
inst-ld-dec


V:\GT-VIAG\INSTDPCT.DRW
inst-mod
inst-dp-ctrl
l-ir0
l-ir1
iri-sel
n-booting
ld0
ld1
n-rf
l0
l1
D
F
F
reset
n-freeze
ld-inst-reg0
ld-inst-reg1
flush
inst-rd
boot-dag
chip-level name
inst-mode name
reset
reset-in
n-freeze
n-freeze-in



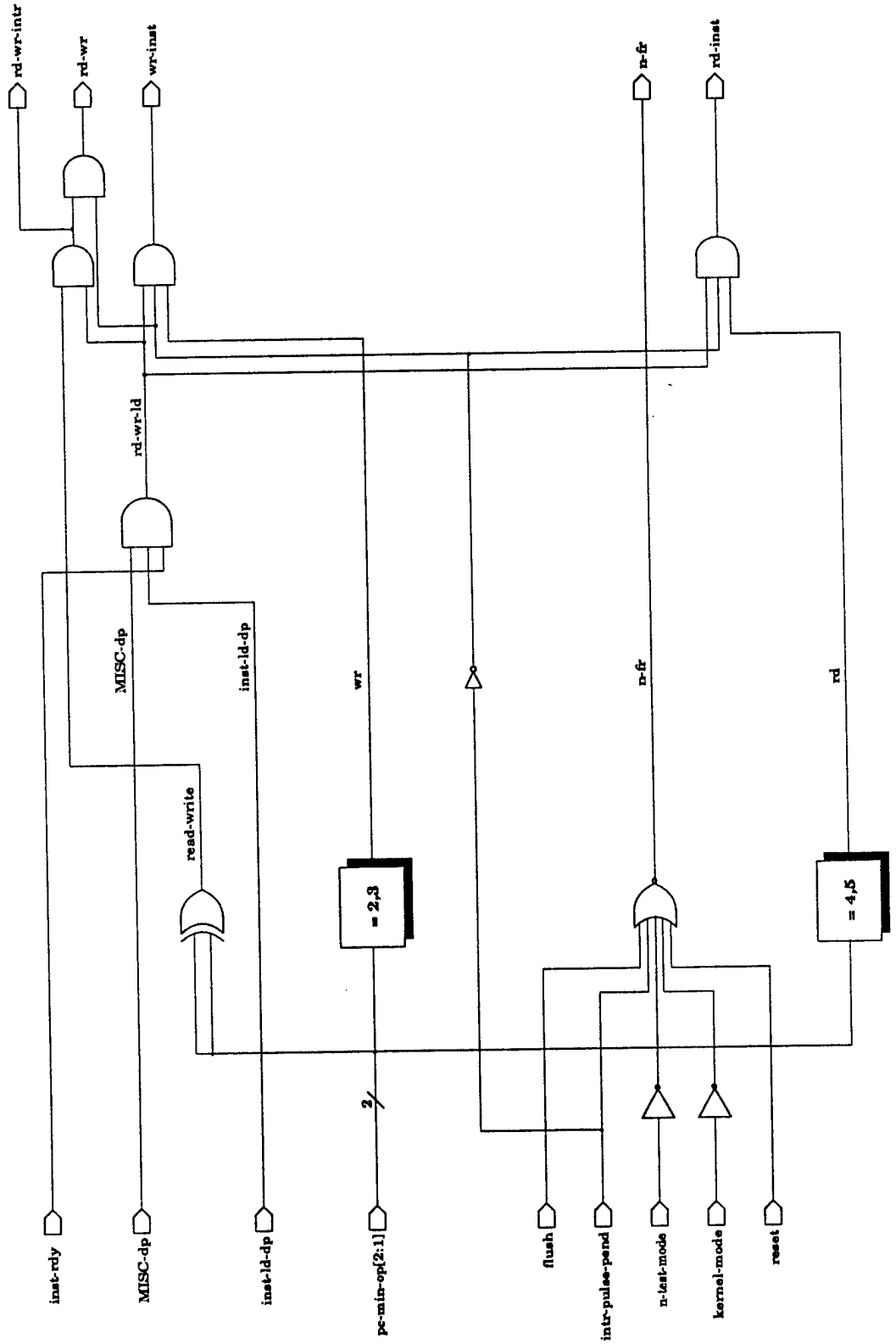
inst-dp

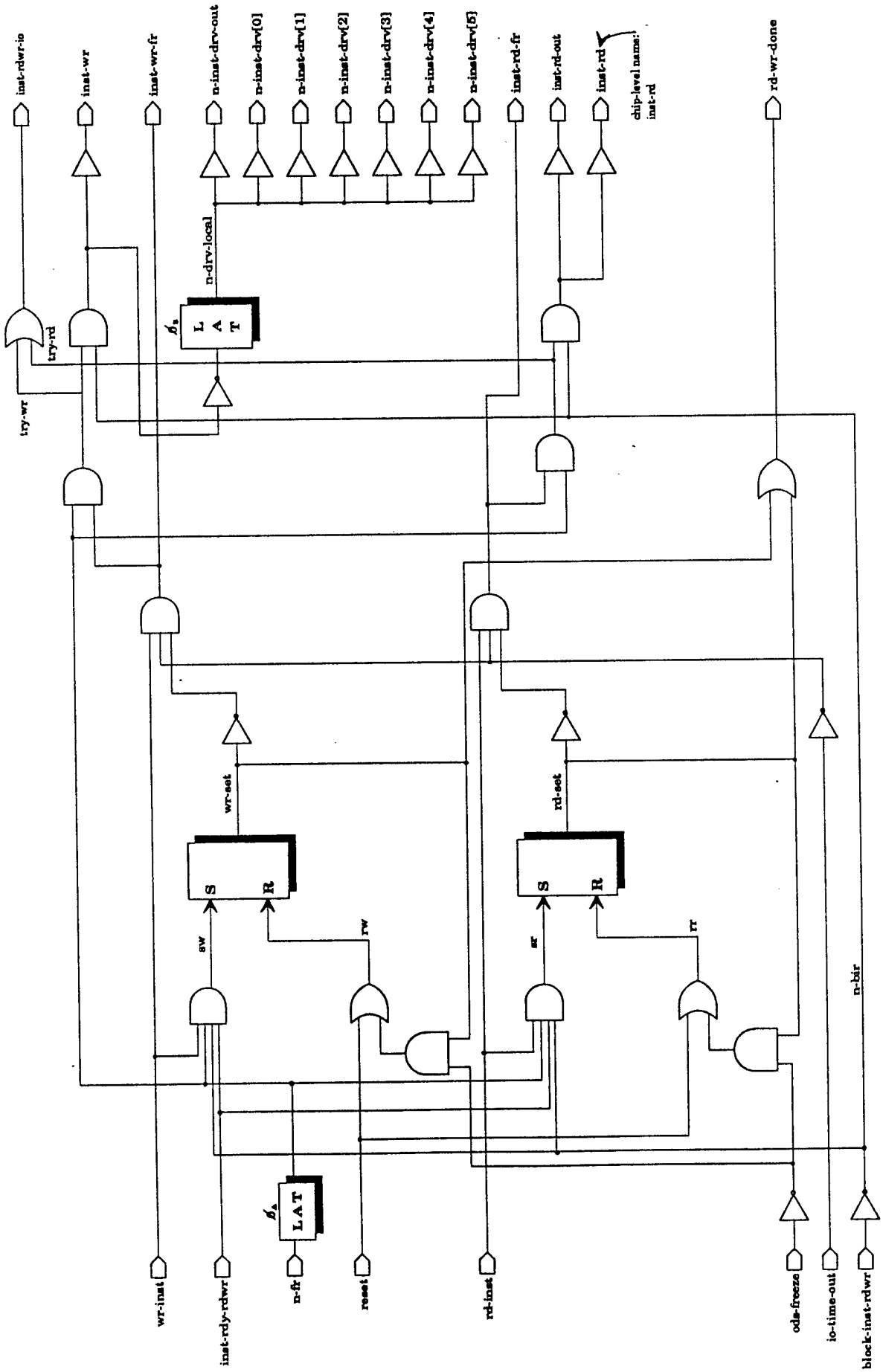
v:\gt-viag\inst-dp.drw

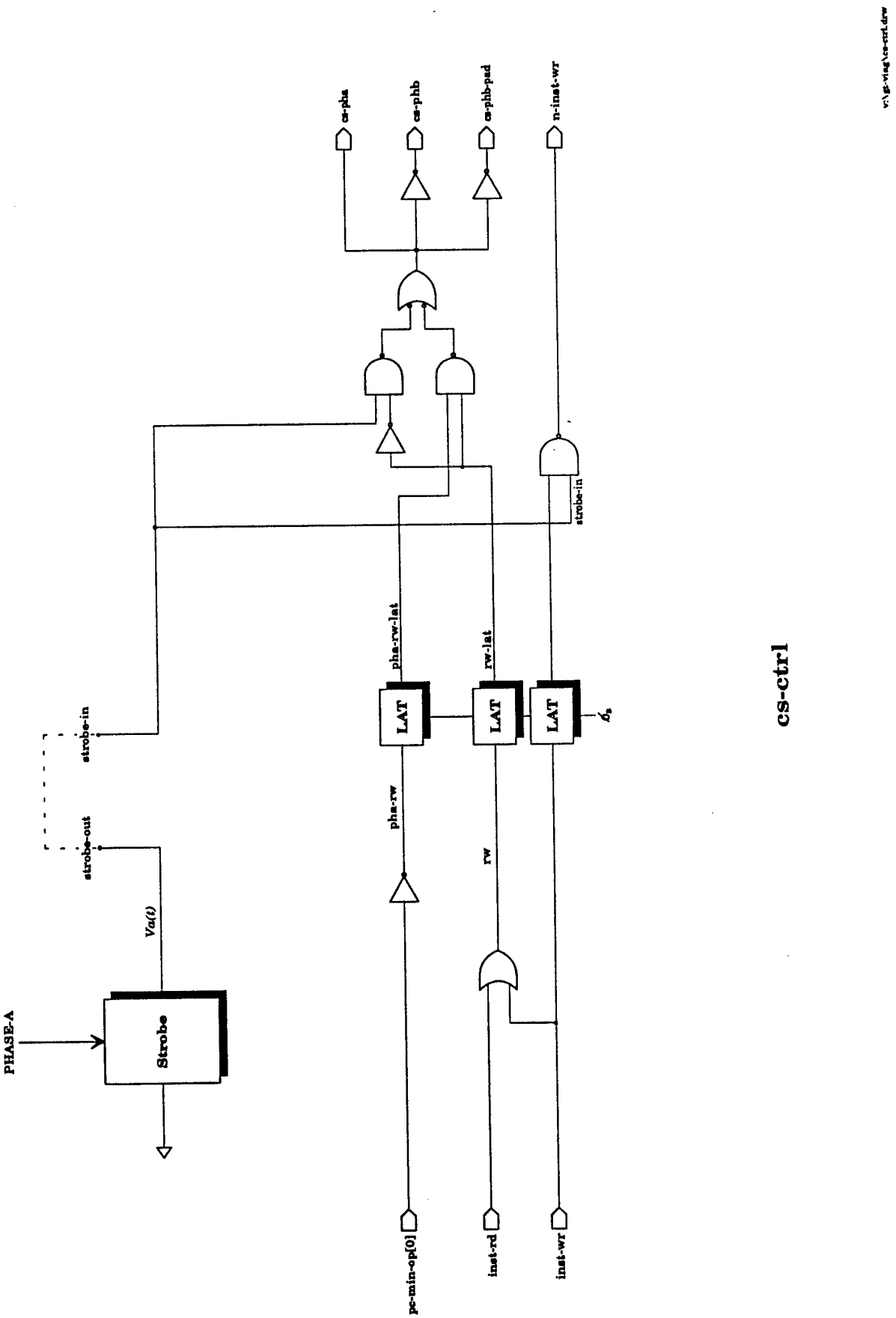


inst-in-dp

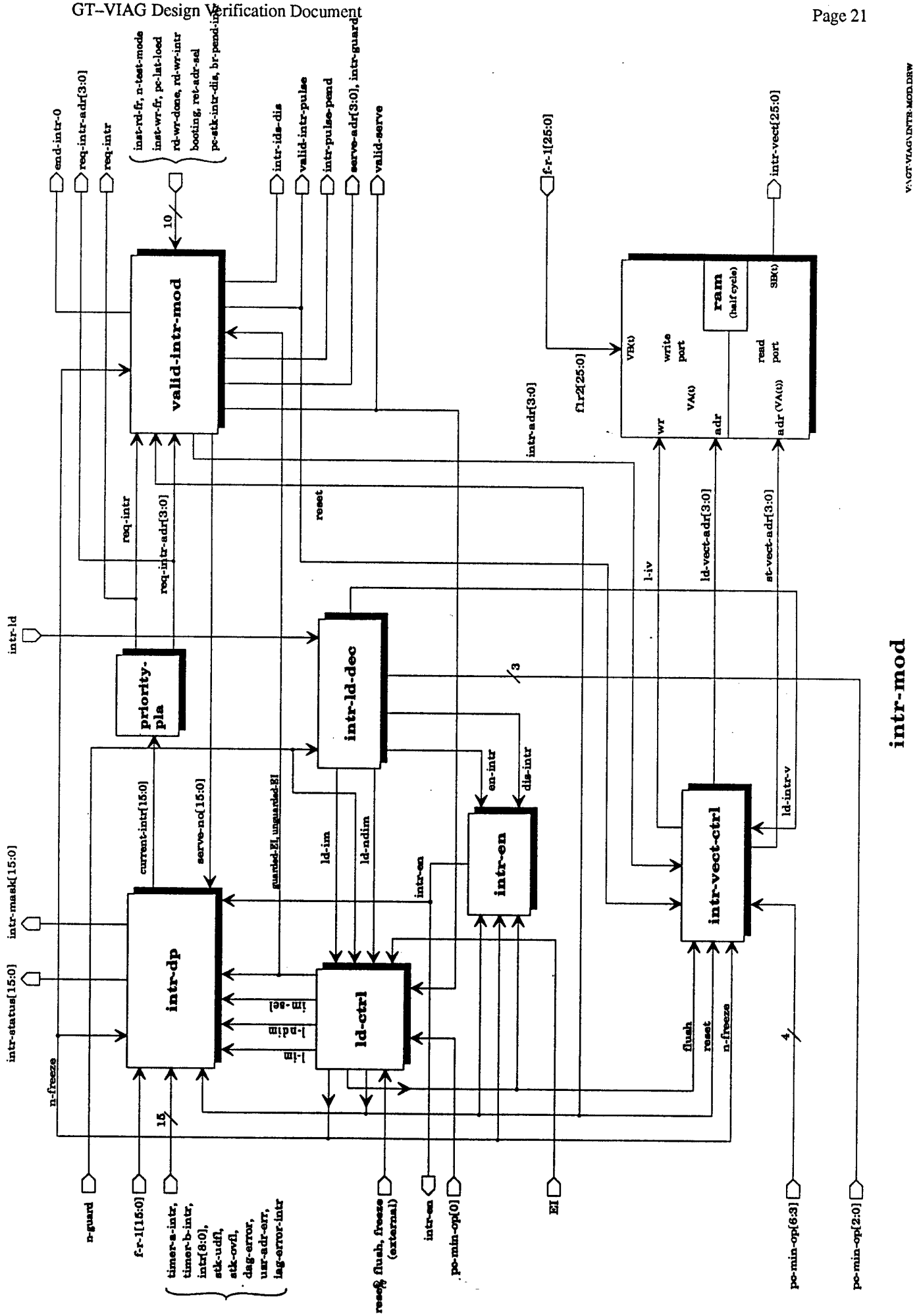
v:\gt-viag\instindp.drw

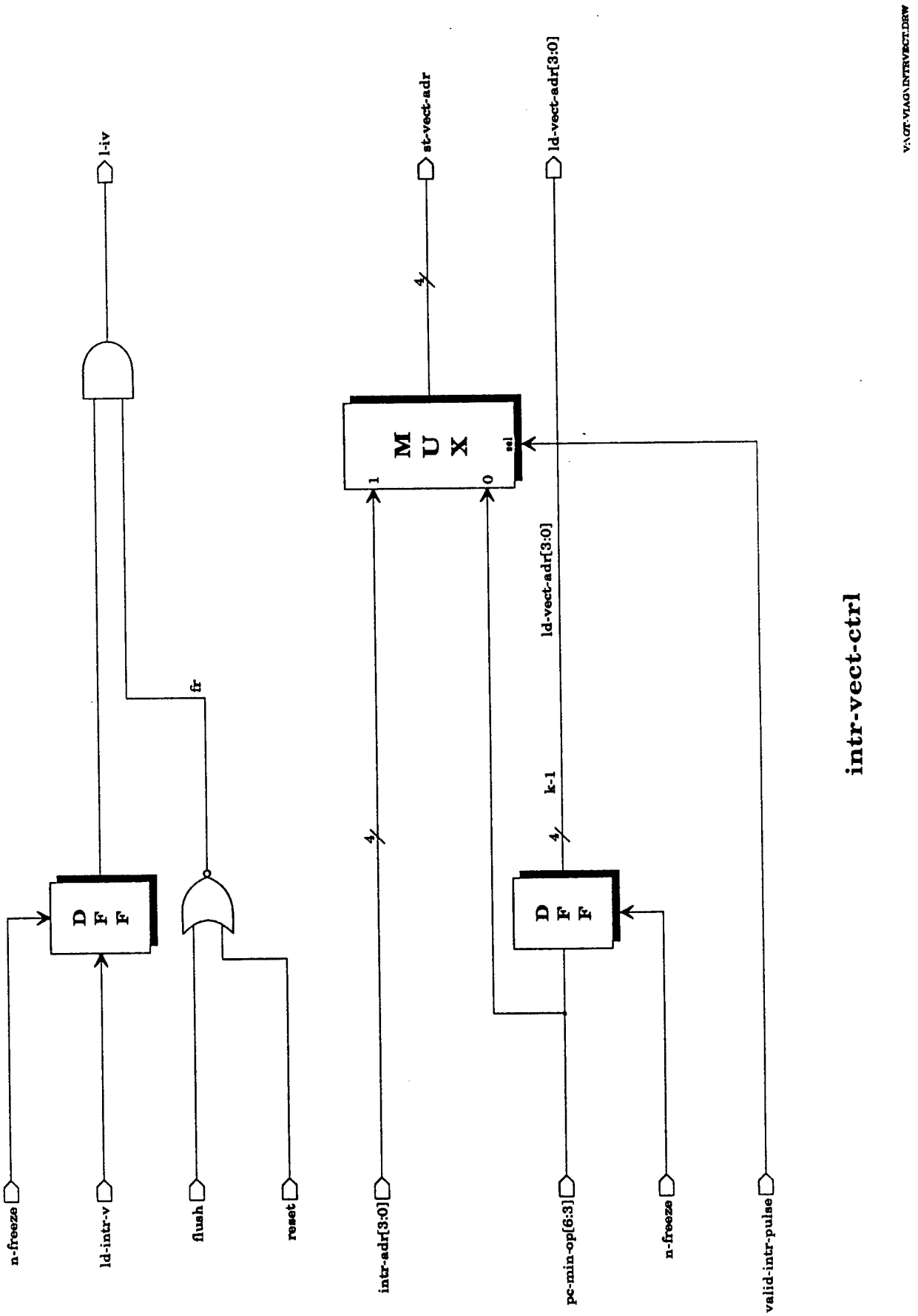

rd-wr-intr
rd-wr
wr-inst
n-fr
rd-inst
rd-wr-ld
MISC-dp
inst-ld-dp
wr
n-fr
rd
read-write
= 2,3
= 4,5
2
inst-rdy
MISC-dp
inst-ld-dp
pc-min-op[2:1]
flush
intr-pulse-pend
n-test-mode
kernel-mode
reset
inst-mod
rd-wr-inst
V:\GT-VIAG\RDWRINST.DRW

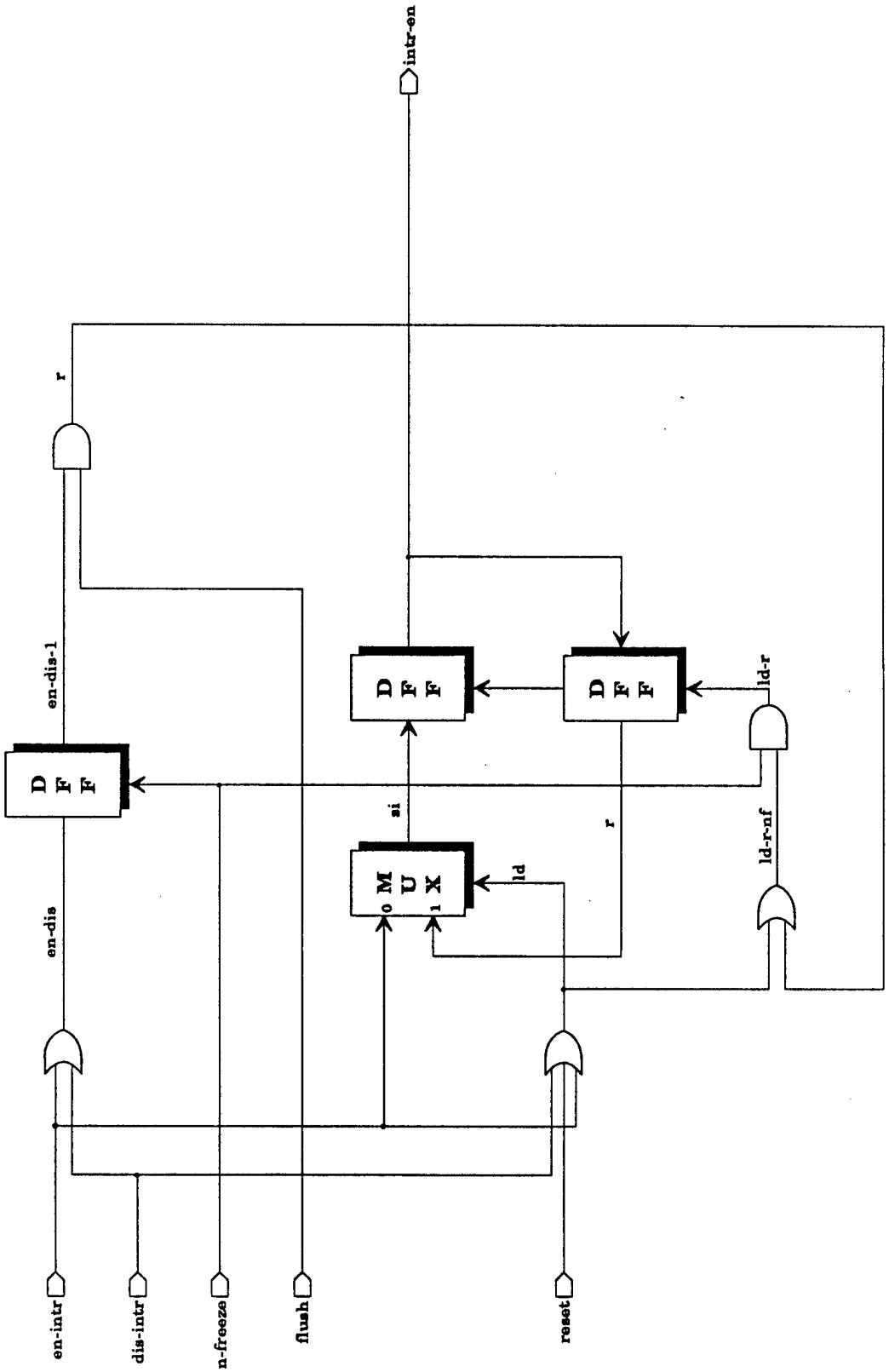

inst-rdwr-io
inst-wr
inst-wr-fr
n-inst-drv-out
n-inst-drv[0]
n-inst-drv[1]
n-inst-drv[2]
n-inst-drv[3]
n-inst-drv[4]
n-inst-drv[5]
inst-rd-fr
inst-rd-out
inst-rd
chip-level name: inst-rd
rd-wr-done
n-drv-local
try-rd
try-wr
L A T
wr-set
rd-set
S
R
sw
rw
sr
rr
n-bir
LAT
wr-inst
inst-rdy-rdwr
n-fr
reset
rd-inst
ods-freeze
io-time-out
block-inst-rdwr
v:\gt-viag\rtwrctrl.drw
inst-mod
rd-wr-ctrl


cs-pha
cs-phb
cs-phb-pad
n-inst-wr
strobe-in
pha-rw-lat
rw-lat
LAT
LAT
LAT
δ_s
strobe-in
strobe-out
pha-rw
rw
Va(t)
PHASE-A
Strobe
pc-min-op[0]
inst-rd
inst-wr

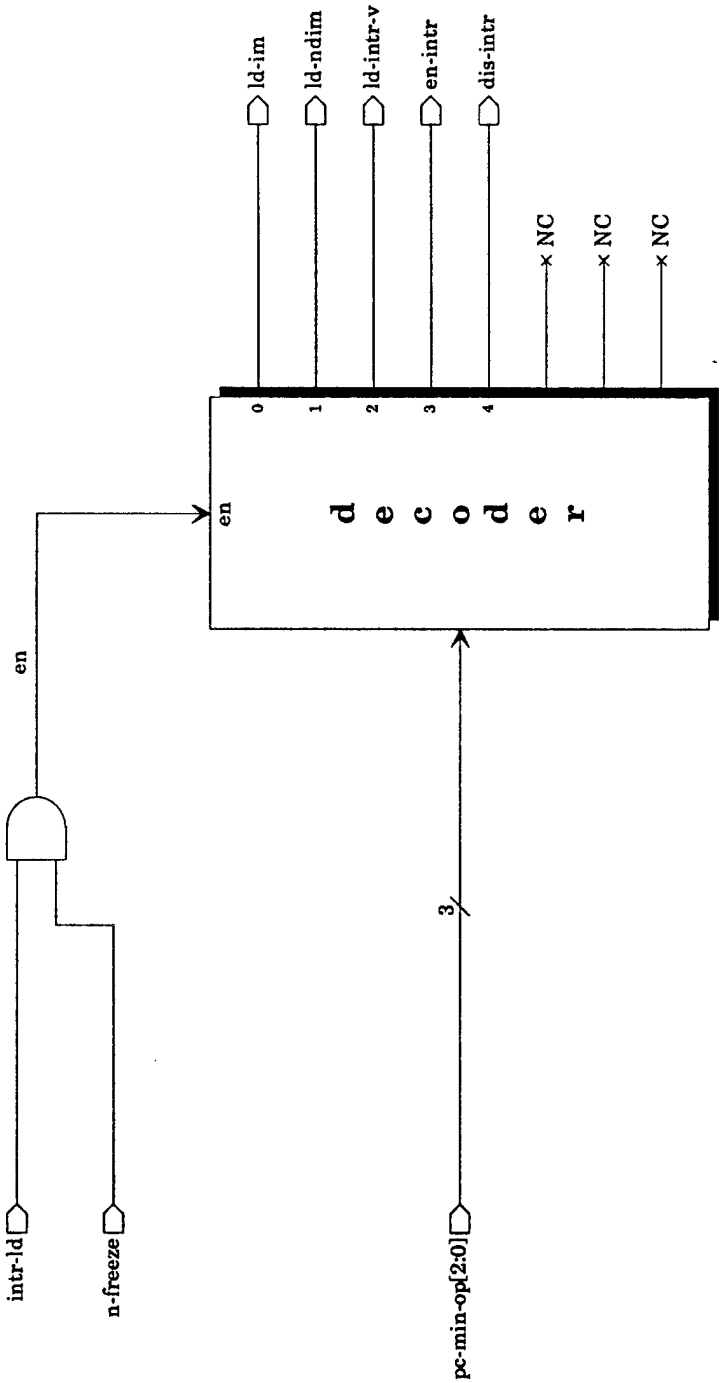
cs-ctrl


intr-mod
valid-intr-mod
priority-pla
intr-ld-dec
intr-dp
ld-ctrl
intr-en
intr-vect-ctrl
ram
(half cycle)
end-intr-0
req-intr-adr[3:0]
req-intr
inst-rd-fr, n-test-mode
inst-wr-fr, pc-lst-load
rd-wr-done, rd-wr-intr
booting, ret-adr-sel
pc-stk-intr-dis, br-pend-int
intr-ids-dis
valid-intr-pulse
intr-pulse-pend
serve-adr[3:0], intr-guard
valid-serve
f-r-1[25:0]
intr-vect[25:0]
intr-ld
intr-mask[15:0]
intr-status[15:0]
n-freeze
n-guard
f-r-1[15:0]
timer-a-intr,
timer-b-intr,
intr[8:0],
stk-udfl,
stk-ovfl,
dag-error,
usr-adr-err,
lag-error-intr
reset, flush, freeze
(external)
intr-en
pc-min-op[0]
EI
pc-min-op[6:3]
pc-min-op[2:0]
intr-adr[3:0]
f1r2[25:0]
VB(t)
write
port
VA(t)
wr
adr
read
port
adr (VA(t))
SB(t)
l-iv
ld-vect-adr[3:0]
st-vect-adr[3:0]
ld-intr-v
current-intr[15:0]
serve-no[15:0]
guarded-EI, unguarded-EI
ld-im
ld-ndim
en-intr
dis-intr
l-im
l-ndim
im-sel
flush
reset
n-freeze
10
15
3
4
V:\GT-VIAG\INTR-MOD.DRW

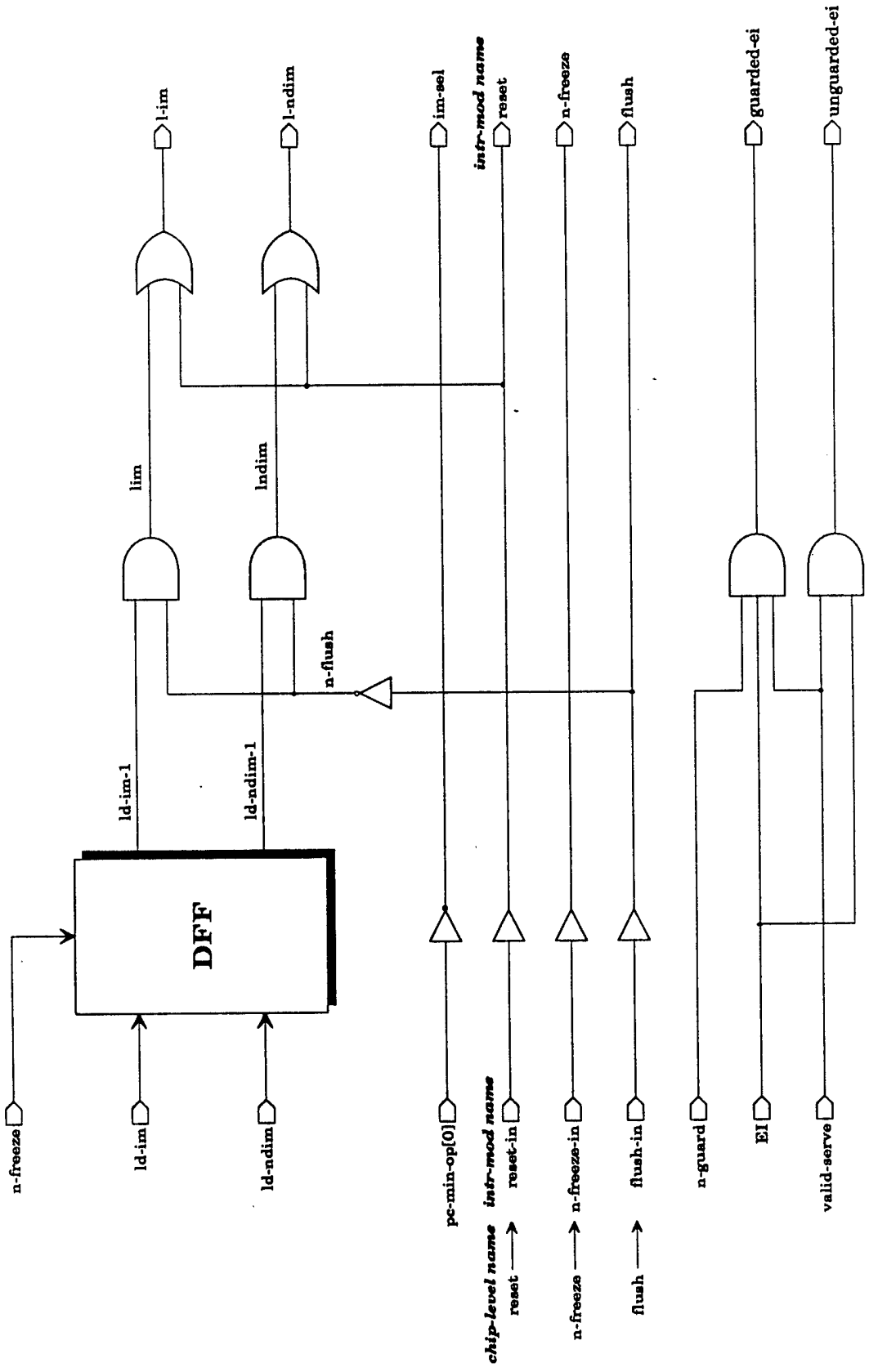

V:\GT-VIAG\INTRVECT.DRW
intr-vect-ctrl
l-iv
st-vect-adr
ld-vect-adr[3:0]
ld-vect-adr[3:0]
fr
M
U
X
sel
1
0
4
4
k-1
D
F
F
D
F
F
n-freeze
ld-intr-v
flush
reset
intr-adr[3:0]
pc-min-op[6:3]
n-freeze
valid-intr-pulse

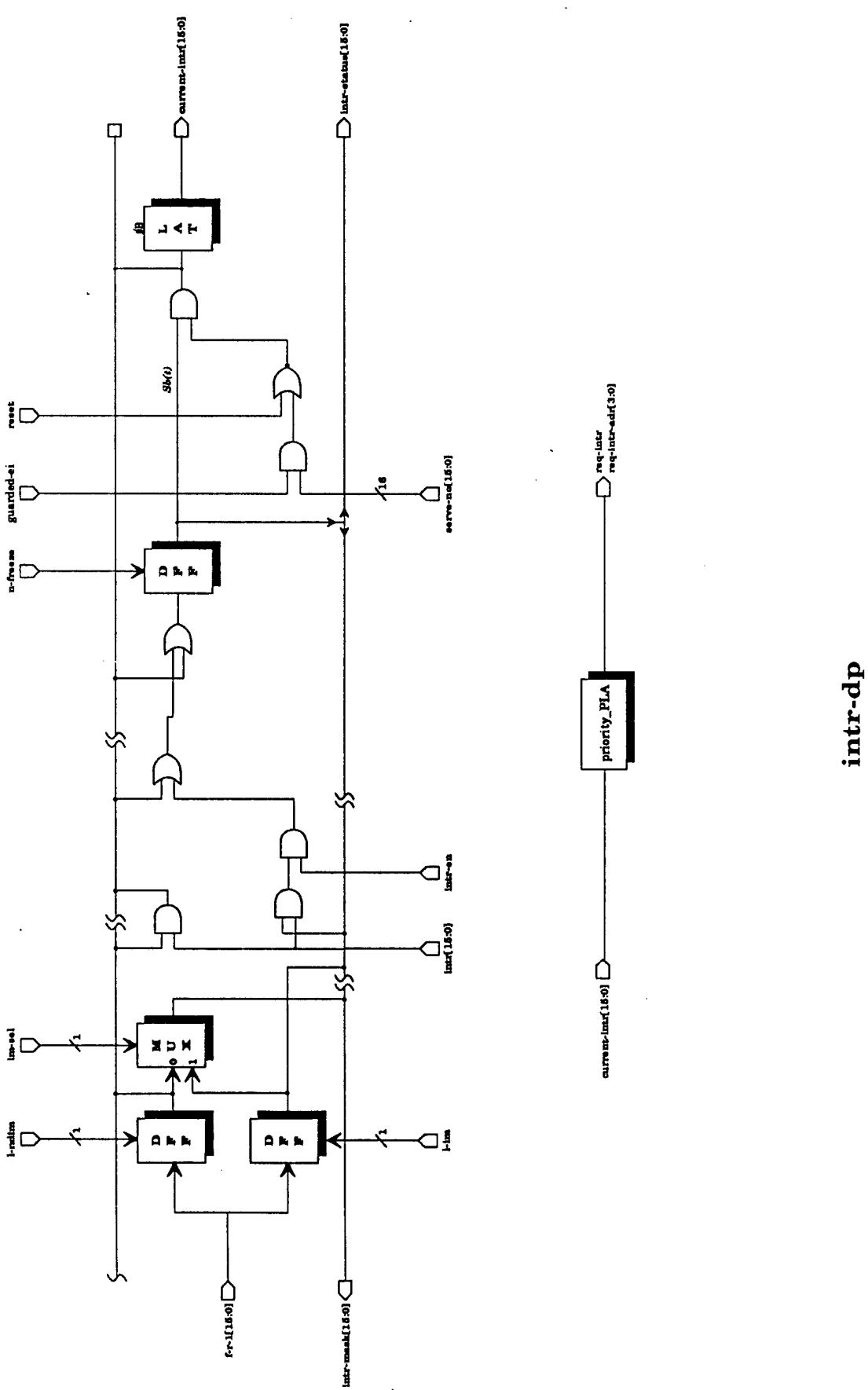

V:\GT-VIAG\INTR-EN.DRW
intr-en
intr-en
r
en-dis-1
en-dis
si
r
ld
ld-r
ld-r-nf
D F F
D F F
D F F
M U X
0
1
en-intr
dis-intr
n-freeze
flush
reset

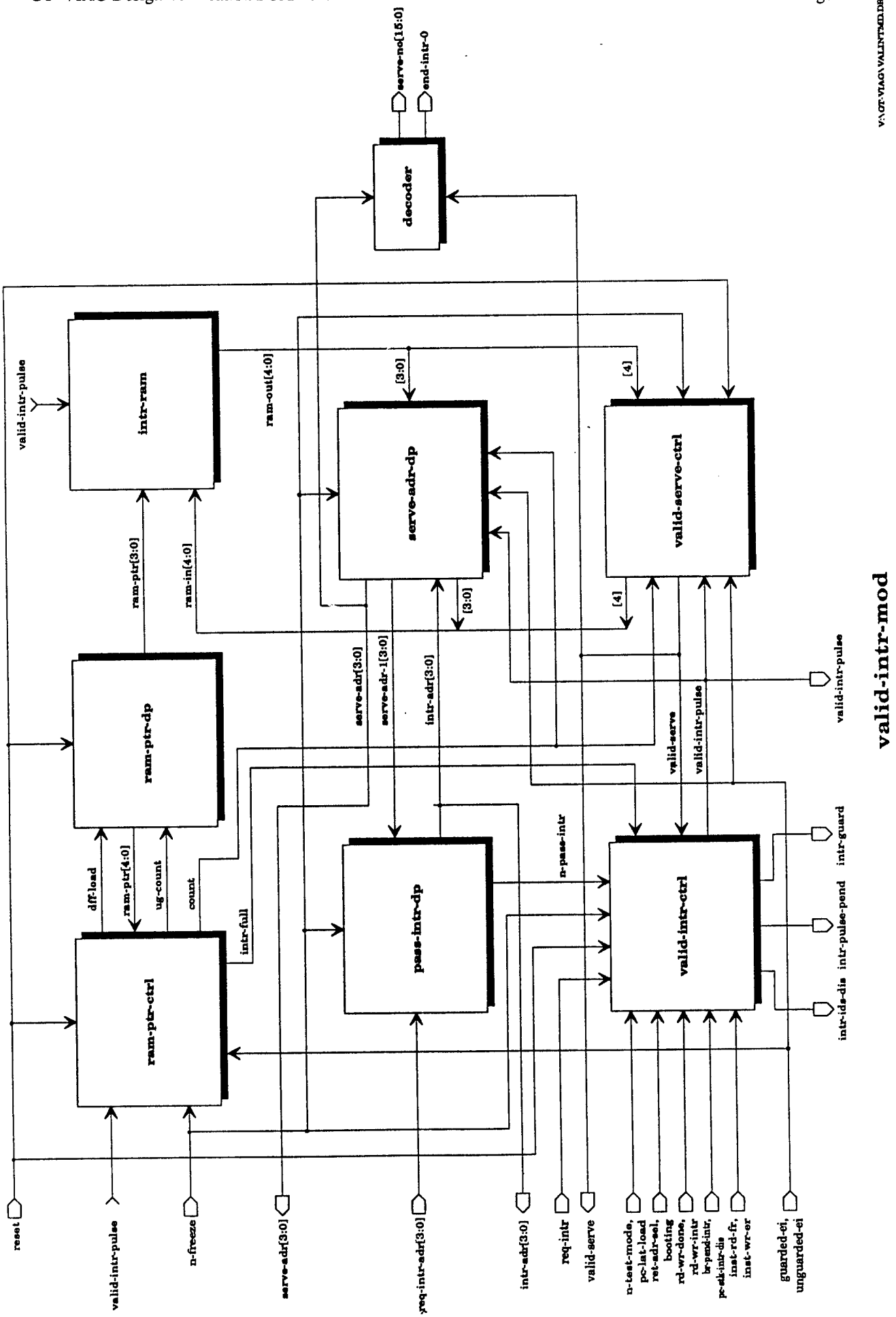
V:\GT-VIAG\INTRLDDE.DRW

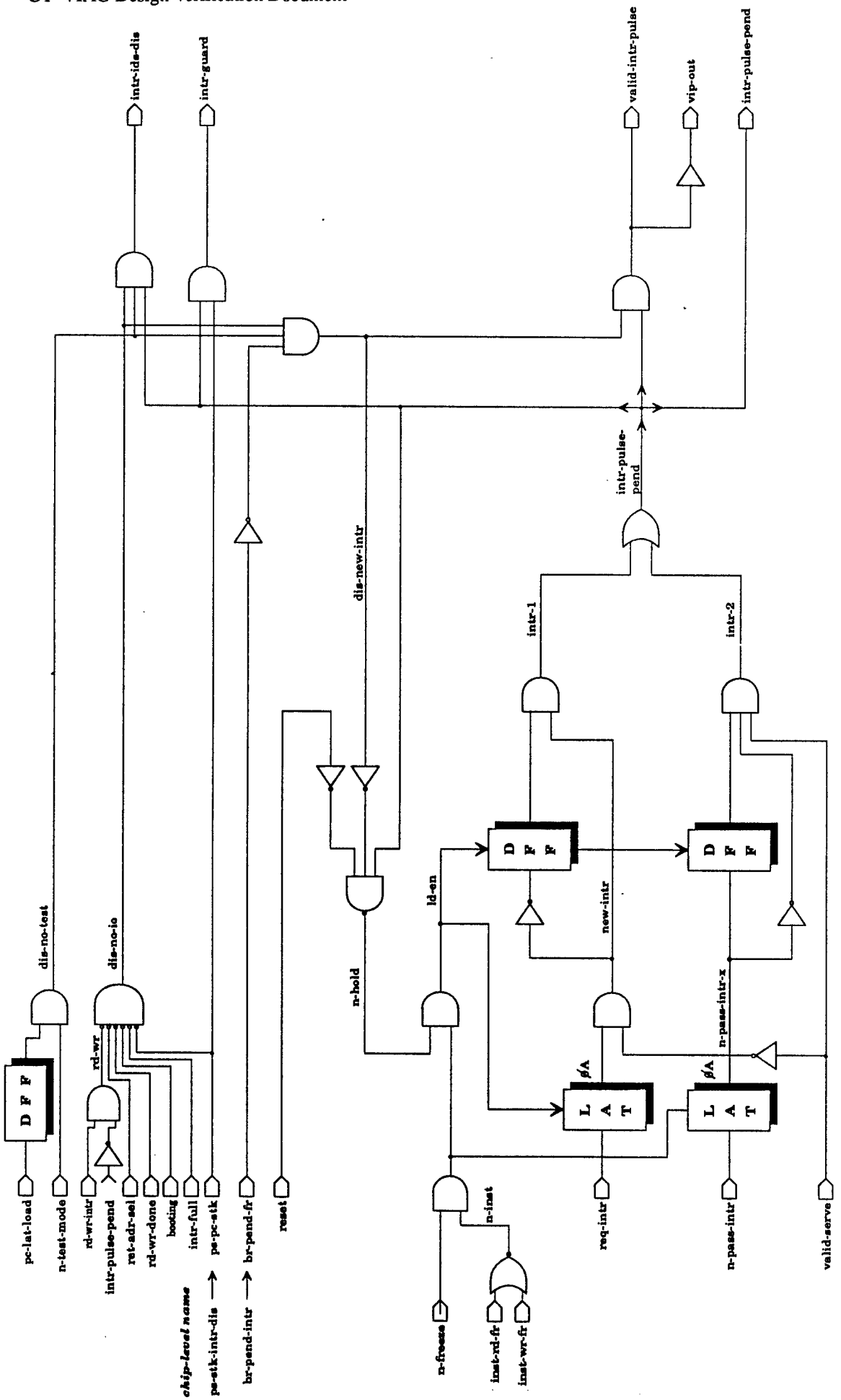


intr-ld-dec


V:\GT-VIAG\LD-CTRL.DRW
intr-mod
ld-ctrl
l-im
l-ndim
im-sel
intr-mod name
reset
n-freeze
flush
guarded-ei
unguarded-ei
lim
lndim
n-flush
ld-im-1
ld-ndim-1
DFF
n-freeze
ld-im
ld-ndim
pc-min-op[0]
chip-level name
intr-mod name
reset
reset-in
n-freeze
n-freeze-in
flush
flush-in
n-guard
EI
valid-serve


V:\GT-VIAG\INTR-DP.DSW
intr-dp
current-intr[15:0]
intr-status[15:0]
reset
guarded-ei
n-freze
lm-sel
l-rdim
l-lm
intr-en
intr[15:0]
serve-nd[15:0]
fr-ll[15:0]
intr-mask[15:0]
req-intr
req-intr-adr[3:0]
priority_PLA
current-intr[15:0]

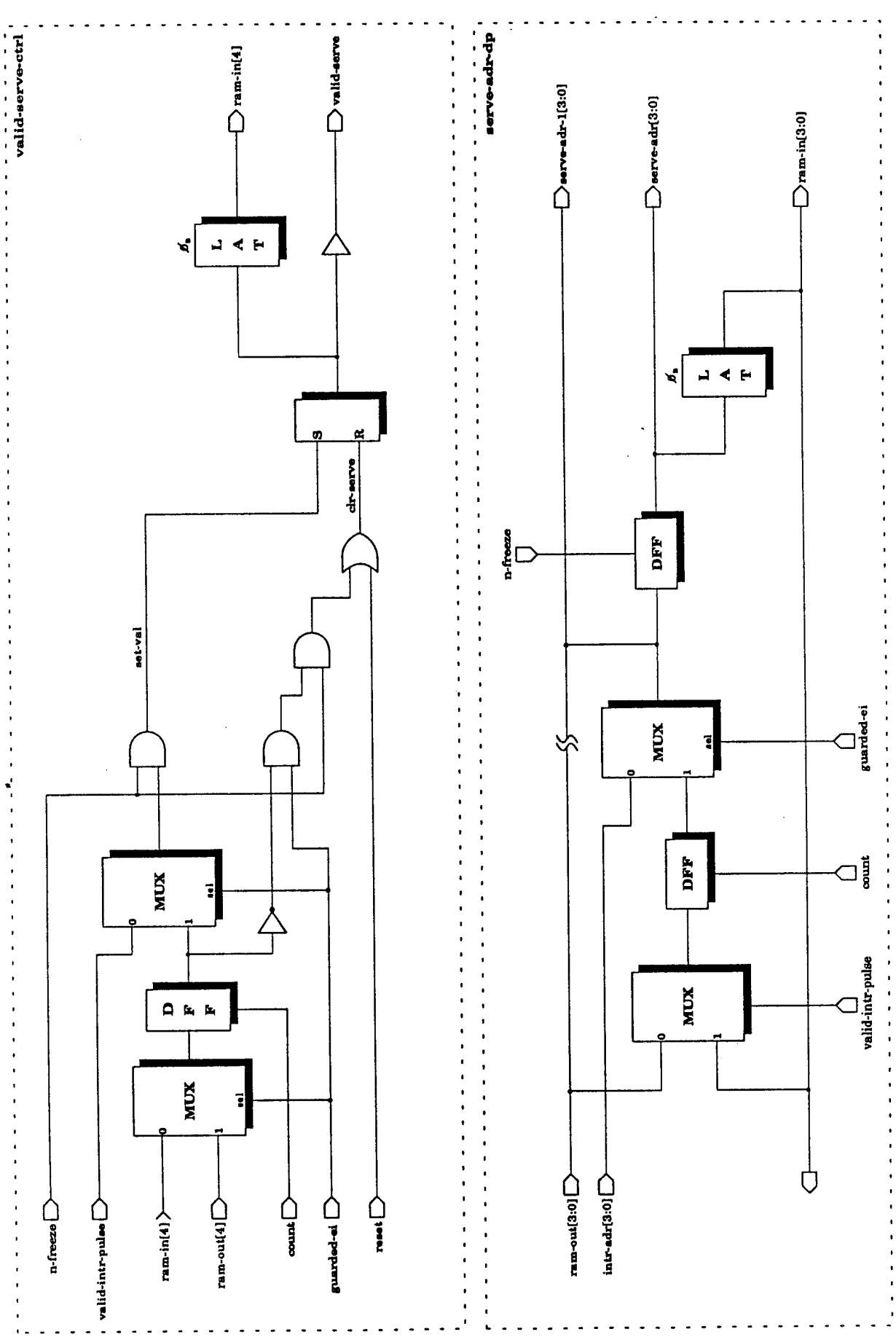

V:\GT-VIAG\VALINTMD.DRW
valid-intr-mod
serve-no[15:0]
end-intr-0
decoder
valid-intr-pulse
intr-ram
ram-out[4:0]
[3:0]
[4]
serve-adr-dp
valid-serve-ctrl
ram-ptr[3:0]
ram-in[4:0]
[3:0]
[4]
ram-ptr-dp
serve-adr[3:0]
serve-adr-1[3:0]
intr-adr[3:0]
valid-intr-pulse
valid-serve
valid-intr-pulse
dff-load
ram-ptr[4:0]
ug-count
count
intr-full
pass-intr-dp
n-pass-intr
valid-intr-ctrl
intr-guard
intr-pulse-pend
intr-ids-dis
ram-ptr-ctrl
reset
valid-intr-pulse
n-freeze
serve-adr[3:0]
yreq-intr-adr[3:0]
intr-adr[3:0]
req-intr
valid-serve
n-test-mode,
pc-lat-load
ret-adr-sel,
booting
rd-wr-done,
rd-wr-intr
ir-pend-intr,
pc-dk-intr-dis
inst-rd-fr,
inst-wr-er
guarded-ei,
unguarded-ei



NOTE: "valid-intr-pulse" is used inside intr-mod
"vip-out" is connected to "valid-intr-pulse"
at the chip level

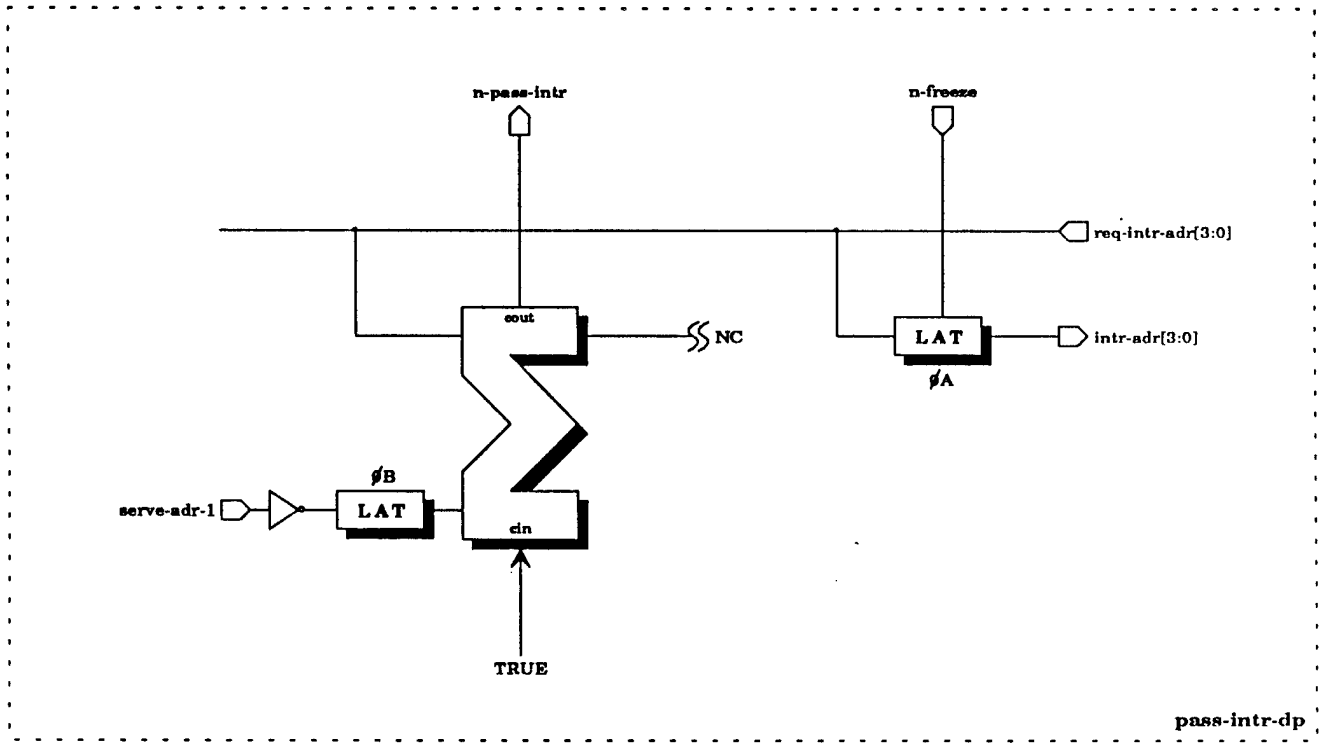
intr-mod
valid-intr-mod
valid-intr-ctrl

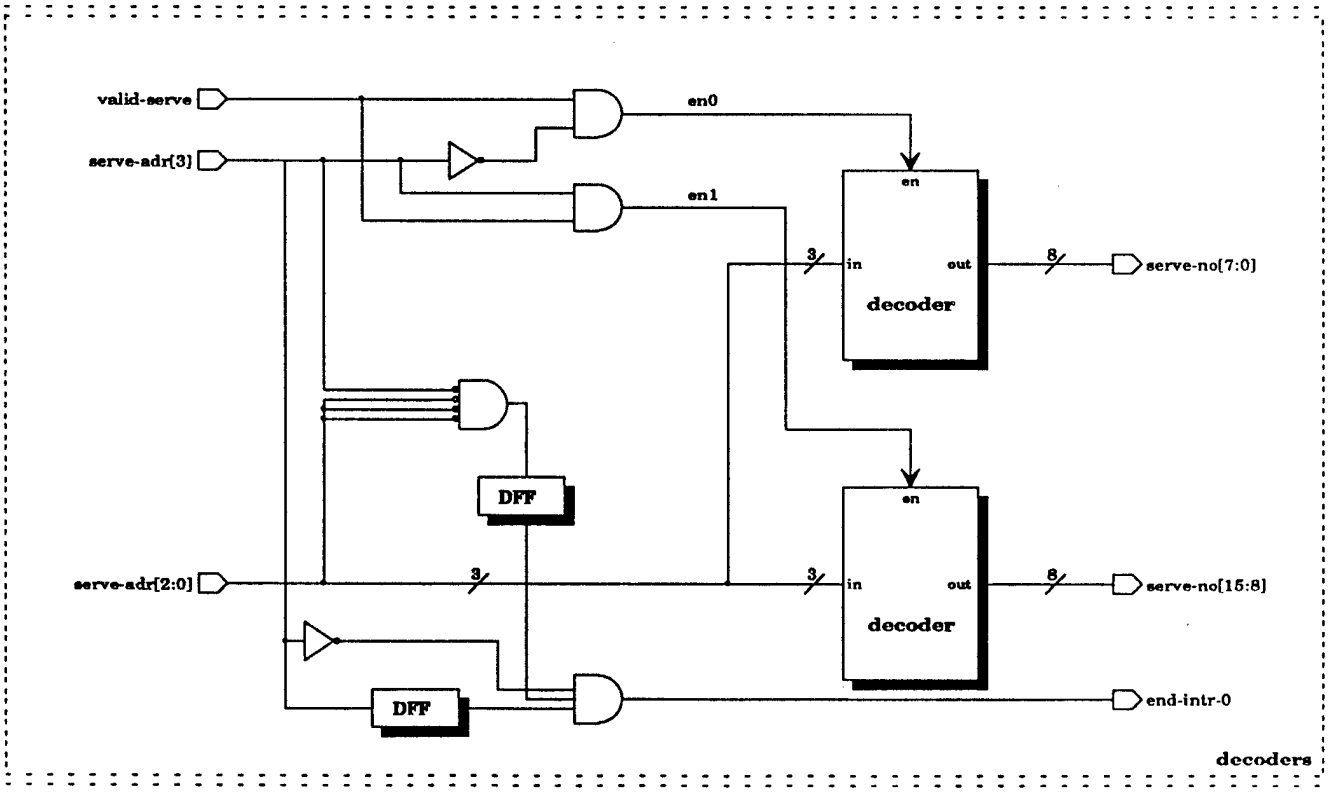
V:\GT-VIAG\VALINTCT.DRW



valid-serve-ctrl
serve-adr-dp

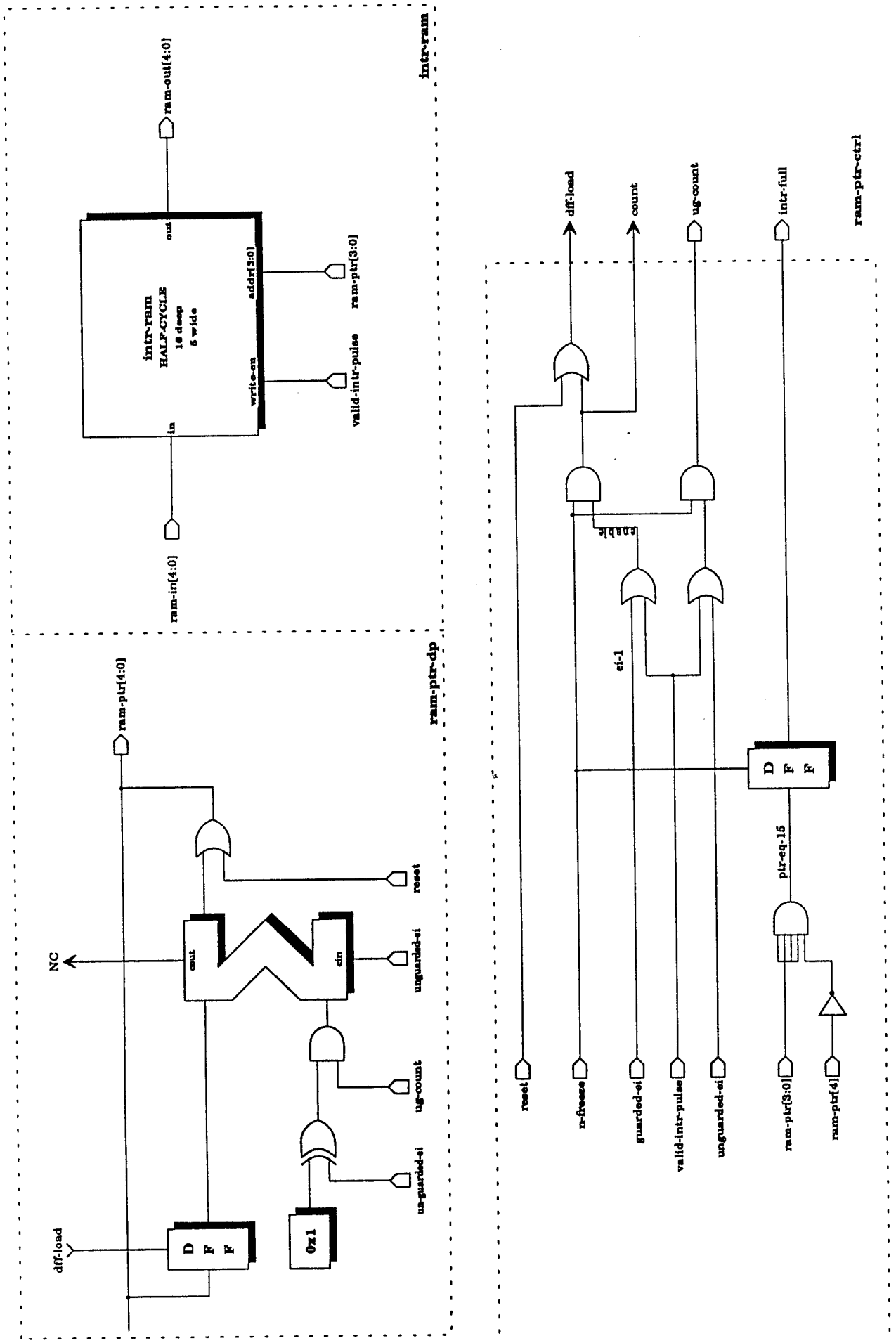
V:\GT-VIAG\VALSERGT.DGW



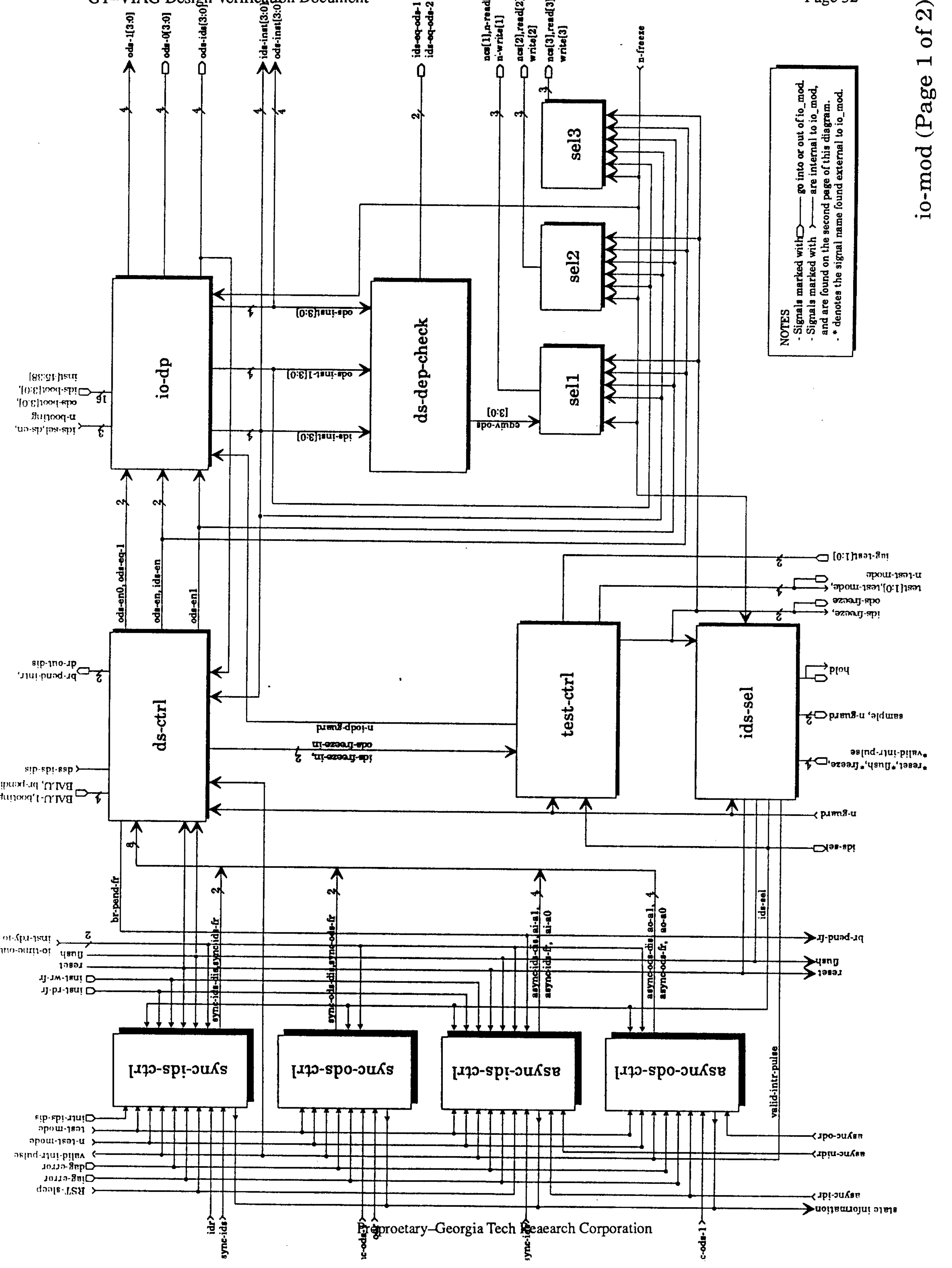


pass-intr-dp
decoders

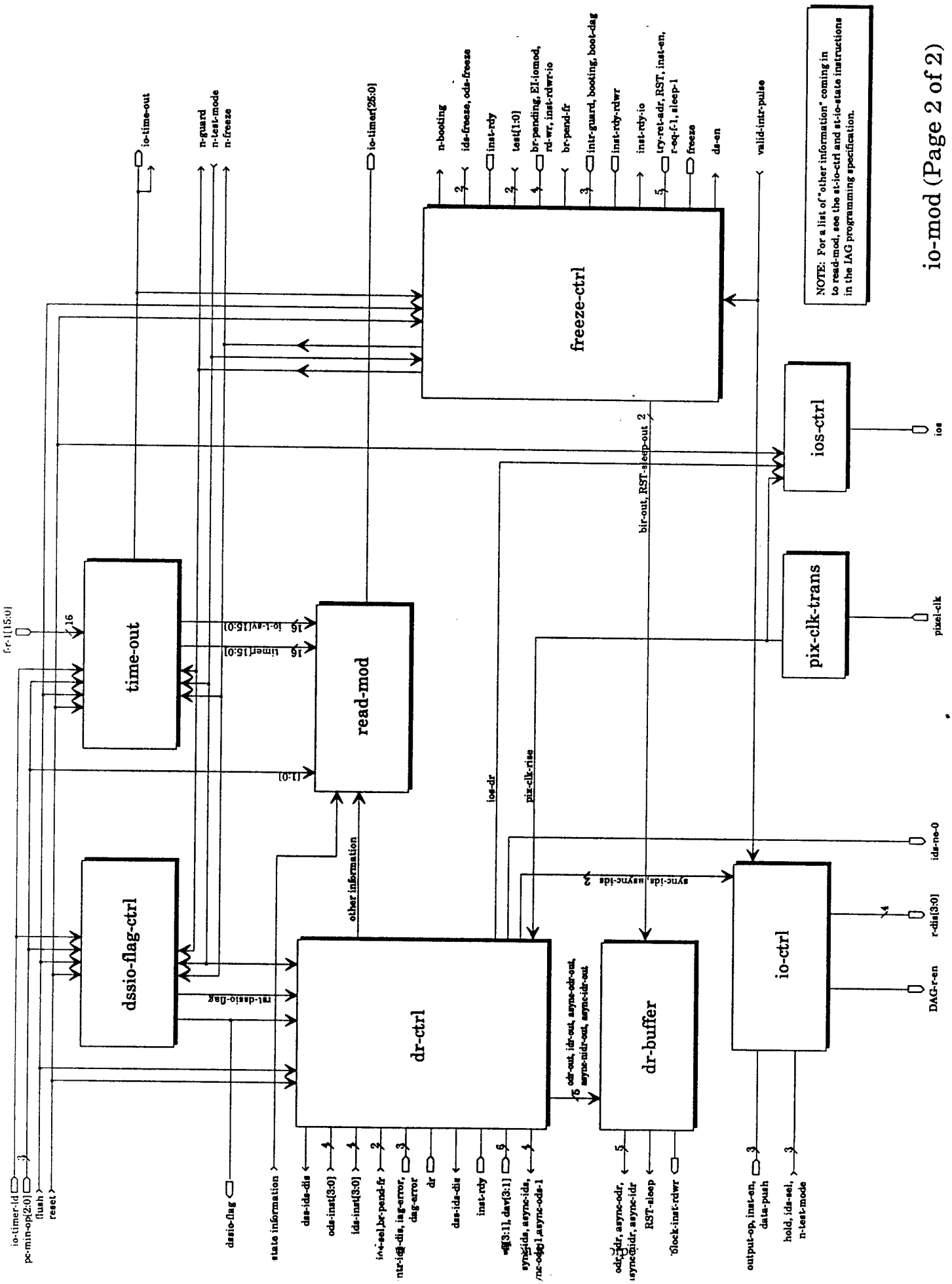
V:\GT-VIAG\DECODERS.DRW

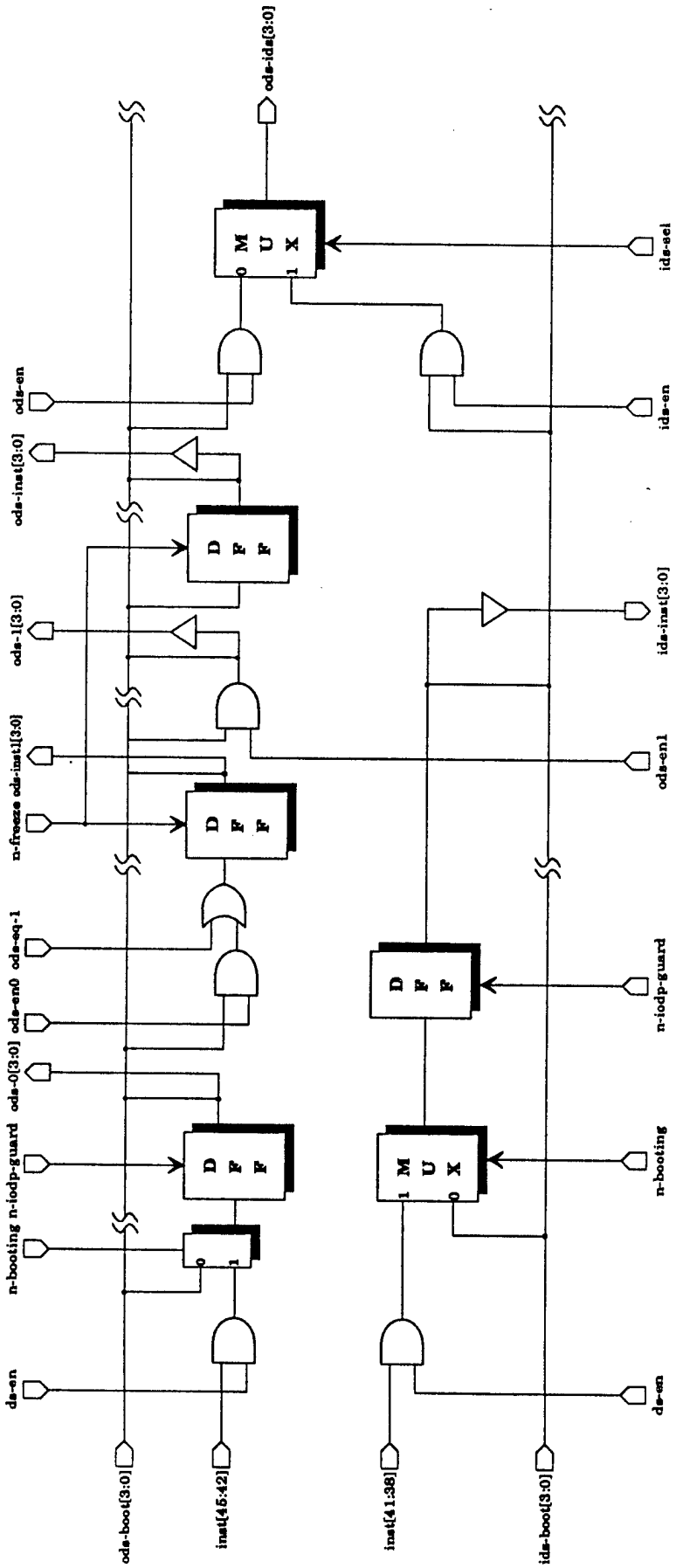

intr-ram
ram-out[4:0]
out
intr-ram
HALF-CYCLE
16 deep
5 wide
addr[3:0]
ram-ptr[3:0]
write-en
valid-intr-pulse
in
ram-in[4:0]
ram-ptr-dp
ram-ptr[4:0]
reset
NC
cout
din
unguarded-ei
ug-count
un-guarded-ei
dff-load
D F F
0x1
ram-ptr-ctrl
dff-load
count
ug-count
intr-full
enable
ei-1
reset
n-freeze
guarded-ei
valid-intr-pulse
unguarded-ei
ptr-eq-15
ram-ptr[3:0]
ram-ptr[4]
V:\GT-VIAG\RAMPTRDP.DRW

ram-ptr-dp



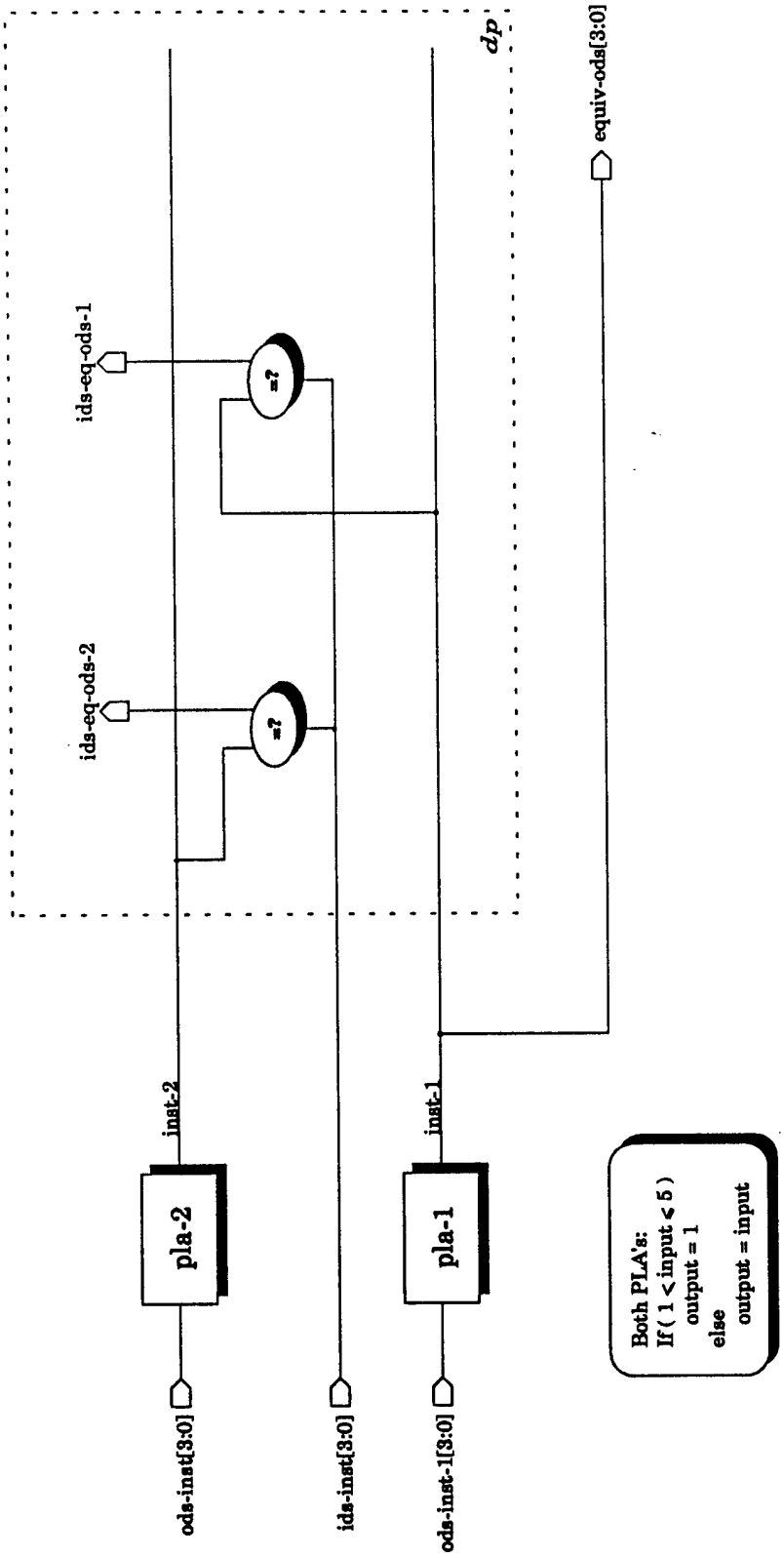
io-mod (Page 1 of 2)


io-mod (Page 2 of 2)
NOTE: For a list of "other information" coming in to read-mod, see the st-io-ctrl and st-io-state instructions in the IAG programming specification.
freeze-ctrl
ios-ctrl
pix-clk-trans
time-out
read-mod
dssio-flag-ctrl
dr-ctrl
dr-buffer
io-ctrl
io-time-out
n-guard
n-test-mode
n-freeze
io-timer[25:0]
n-booting
ids-freeze, ods-freeze
inst-rdy
test[1:0]
br-pending, EI-iomod, rd-wr, inst-rdwr-io
br-pend-fr
intr-guard, booting, boot-dag
inst-rdy-rdwr
inst-rdy-io
try-ret-adr, RST, inst-en, r-eq-f-1, sleep-1
freeze
ds-en
valid-intr-pulse
bir-out, RST-sleep-out
ios
pixel-clk
pix-clk-rise
ios-dr
other information
ids-no-0
sync-ids, async-ids
r-dis[3:0]
DAG-r-en
odr-out, idr-out, async-odr-out, async-idr-out
odr, idr, async-odr, async-idr
RST-sleep
block-inst-rdwr
output-op, inst-en, data-push
hold, ids-sel, n-test-mode
state information
dssio-flag
dss-ids-dis
ods-inst[3:0]
ids-inst[3:0]
br-pend-fr
intr-ids-dis, iag-error, dag-error
dr
inst-rdy
async-ids, async-ods-1
io-timer-ld
pc-min-op[2:0]
flush
reset
r-r-1[15:0]
io-t-av[15:0]
timer[15:0]
[1:0]



V:\GT-VIAG\IO-DP.DRW

io-mod
io-dp



ds-dep-check-mod

V:\GT-VIAG\DS-DEP.DRW

ods-en0 = ~BALU * ~flush * ~reset-1 * ~reset * ~valid-intr-pulse * n-guard

ods-en1 = ~flush * ~reset-1

ods-en = ~async-ods-dis * ~sync-ods-dis * ~reset-1

ids-en = ~async-ids-dis * ~sync-ids-dis * ~reset * ~flush * ~dss-ids-dis * ~reset1

dr-out-dis = ods-ids[0] + ods-ids[1] + (ao - a1 * ao - a0) + (ai - a1 * ai - a0)

ods-freeze-in = sync-ods-fr + async-ods-fr

ids-freeze-in = sync-ids-fr + async-ids-fr

br-pend-fr = (ids-inst[3] + ids-inst[2] + ids-inst[1]) * br-pending

(reset-1 = Z^{-1} reset)

br-pend-intr = (ids-inst[3] + ids-inst[2] + ids-inst[1]) * BALU - 1

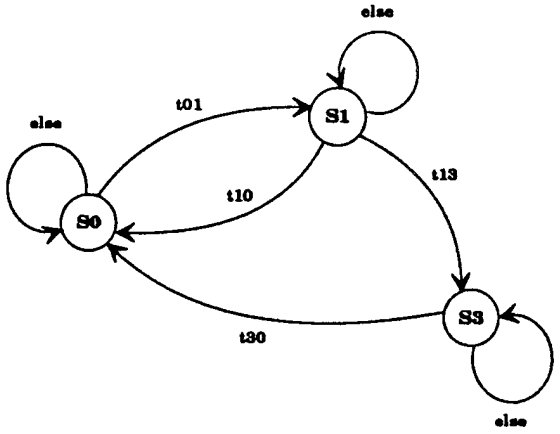
ods-eq-1 = BALU * ~flush * ~reset * ~reset-1 * ~booting*n-guard

Note: "ai - a1,0" is the state of async-ids-ctrl
"ao - a1,0" is the state of async-ods-ctrl

io-mod
ds-ctrl

V:\GT-VIAG\DS-CTRL.DRW

Input: idr, sync-ids, dag-error, valid-intr-pulse, io-time-out, ids-inst[3:2],
br-pending, inst-rdy, ids-sel, flush, inst-rd-fr, inst-wr-fr, iag-error



state:
on reset
goto S0

ctrl:
- idr-en = ~dag-error * ~iag-error * ~flush * ~Z^{-1}reset * ~inst-rd-fr * ~inst-wr-fr * ~Z^{-1}inst-rdy * ~RST-sleep ~(intr-ids-dis * ~br-pend-fr) * ~test-mode
- ids-rdy = idr * idr-en * ids-sel
- active-ids = sync-ids * ~flush * ids-sel * ~br-pend-fr

transition:
- t01 = (active-ids * ~ids-rdy * idr-en * ids-sel)*n-test-mode
- t10 = ids-rdy*n-test-mode
- t13 = (~ids-rdy * io-time-out)*n-test-mode
- t30 = (valid-intr-pulse)*n-test-mode

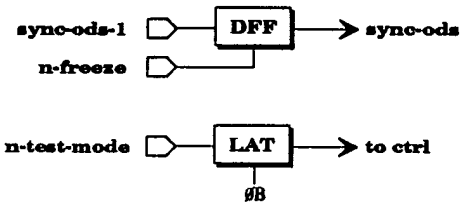
Output:

ctrl:
- sync-ids-dis = sync-ids * ~flush * ~idr-en + S2 + S3 + br-pend-fr
- sync-ids-fr = active-ids * idr-en * ids-sel * ~idr + S1 * ~ids-rdy + S3 * ~valid-intr-pulse

io-mod
sync-ids-ctrl

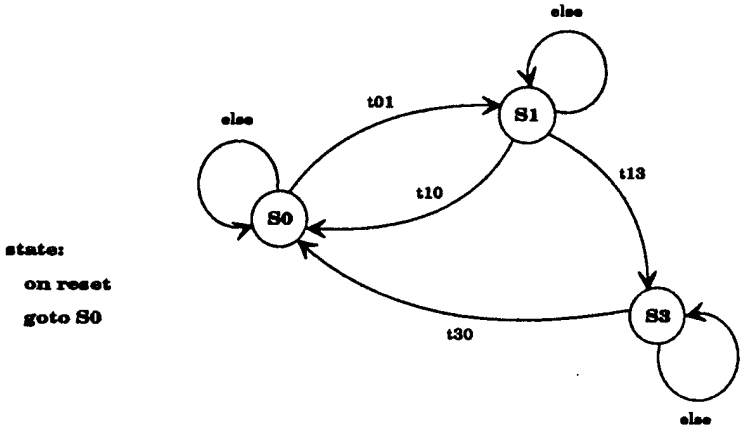
V:\GT-VIAG\SYNCIDSC.DRW

Input: odr, sync-ods, dag-error, iag-error, valid-intr-pulse, io-time-out, inst-rdy, ids-sel, flush, inst-rd-fr, inst-wr-fr, prepare-intr



ctrl:

- odr-en = Z^{-1}(~dag-error-in * ~iag-error-x * ~reset * inst-rdy) * ~S2 * ~test-mode
- ods-rdy = odr * odr-en * ~Z^{-1}ids-sel
- active-ods = sync-ods * ~(ids-sel Z^{-1})



state:
on reset
goto S0

transition:

- t01 = (active-ods * ~ods-rdy * odr-en * ~Z^{-1} ids-sel)*n-test-mode
- t10 = (ods-rdy)*n-test-mode
- t13 = (~ods-rdy * io-time-out)*n-test-mode
- t30 = (valid-intr-pulse)*n-test-mode

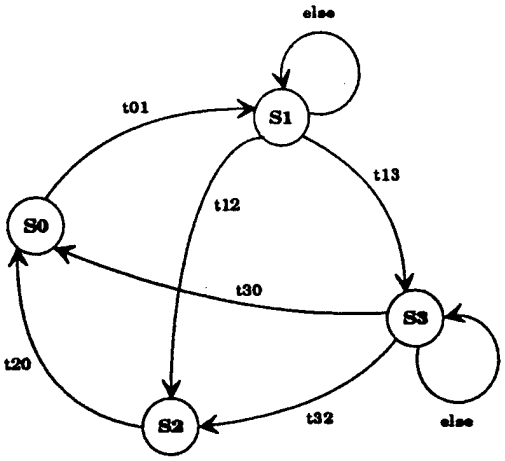
Output:

ctrl:

- sync-ods-dis = sync-ods * ~odr-en + S2 + S3
- sync-ods-fr = active-ods * odr-en * ~Z^{-1}ids-sel * ~odr * S0 + S1 * ~ods-rdy + S3 * ~valid-intr-pulse

io-mod
sync-ods-ctrl

V:\GT-VIAG\SYNCODSC.DRW



state:
- **on reset**
- **goto S0**

ctrl:

- **idr-en** = ~dag-error * ~iag-error * ~flush * ~Z^{-1}reset * ids-sel * ~inst-rd-fr * ~inst-wr-fr * Z^{-1}inst-rdy * ~RST-sleep
- **ids-rdy** = async-n-dr * idr-en
- **active-ids** = async-ids * ~flush * ids-sel * ~br-pend-fr

transitions:

- **t01 =** (active-ids * ~br-pending * ~valid-intr-pulse)*n-test-mode
- **t13 =** (async-dr)*n-test-mode
- **t30 =** (ids-rdy)*n-test-mode
- **t32 =** (~ids-rdy * io-time-out)*n-test-mode
- **t20 =** (valid-intr-pulse)*n-test-mode
- **t12 =** (async-ndr*io-time-out)*n-test-mode

Input: idr, sync-ids, dag-error, iag-error, valid-intr-pulse, io-time-out, inst-rdy, ids-sel, flush, inst-rd-fr, inst-wr-fr

Output:

ctrl:

- **async-ids-dis** = S0 * async-ods * ~flush + S2 + br-pend-fr + s3
- **sample-int** = active-ids*async-dr*n-test-mode
- **hold-in** = active-ids*s3 * n-test-mode
- **async-ids-fr** = active-ids * S0 * ~valid-intr-pulse + S1 + S3 * ~ids-rdy + S2 * ~valid-intr-pulse

io-mod
async-ids-ctrl

V:\GT-VIAG\ASYNCIDS.DRW

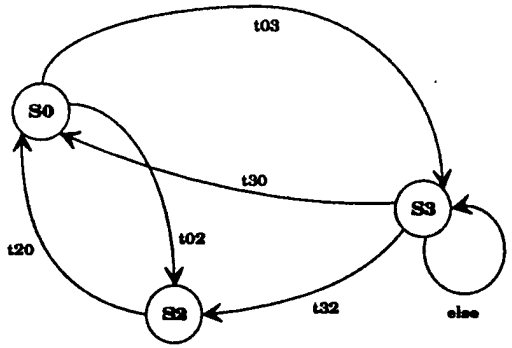
ctrl:

- odr-en = Z^{-1}(~dag-error-in * ~iag-error-x * ~reset * inst-rdy) * Z^{1} ids-sel
- ods-rdy = async-dr * odr-en
- active-ods = async-ods * ~ids-sel

state:

on reset

goto S0



transition:

- t03 = (active-ods*async-idr*odr-en)*n-test-mode
- t30 = (~ods-rdy)*n-test-mode
- t32 = (ods-rdy * io-time-out)*n-test-mode
- t20 = (valid-intr-pulse)*n-test-mode
- t02 = (~ods-rdy*io-time-out*active-ods)*n-test-mode

Input: odr, sync-ods, dag-error, iag-error, valid-intr-pulse, io-time-out, inst-rdy, ids-sel, flush, inst-rd-fr, inst-wr-fr, prepare-intr

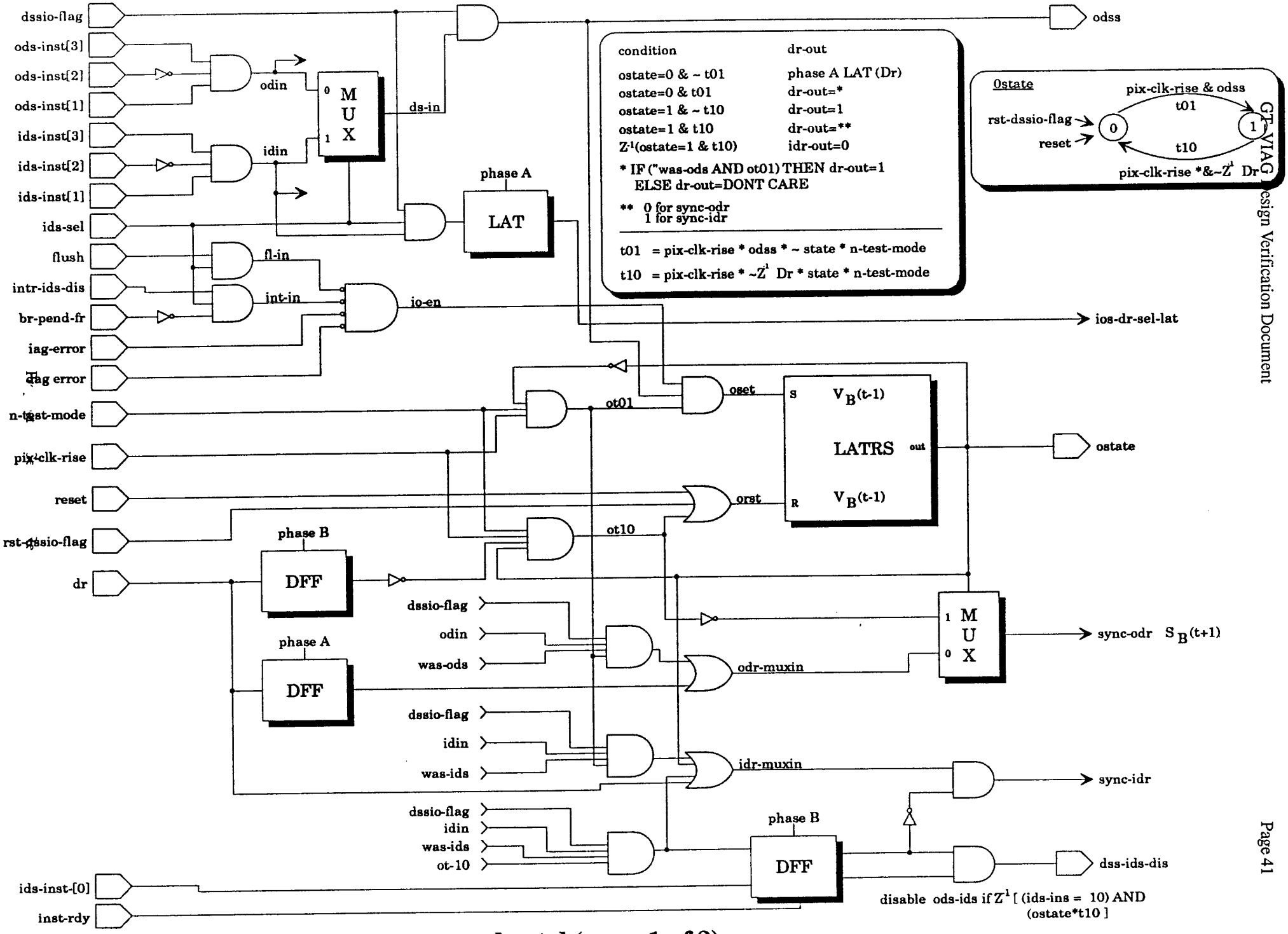
Output:

ctrl:

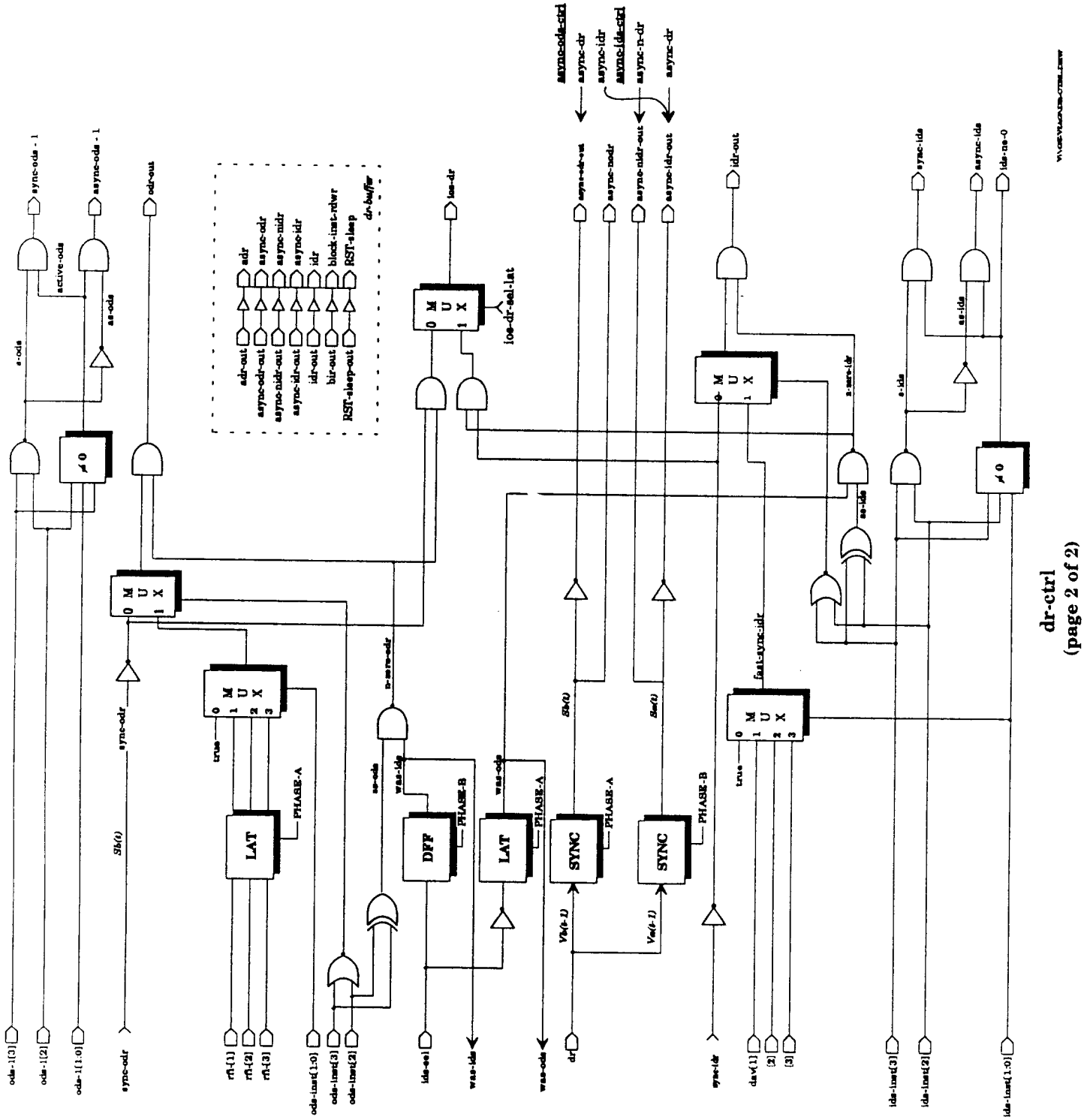
- async-ods-dis = S2 + S3
- async-ods-fr = active-ods * S0 + S3 *ods-rdy + S2 * ~valid-intr-pulse

io-mod
async-ods-ctrl

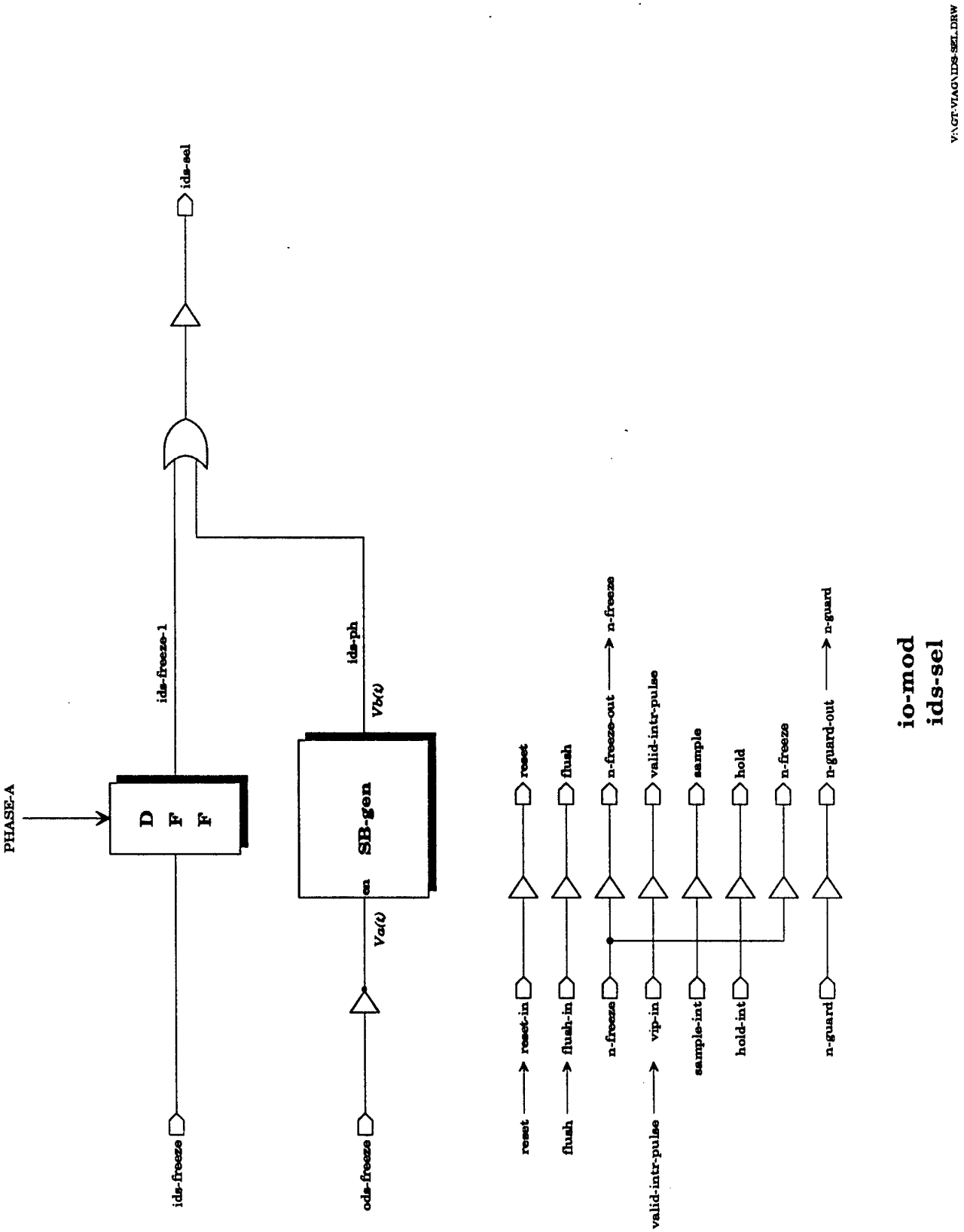
V:\GT-VIAG\ASYNCODS.DRW

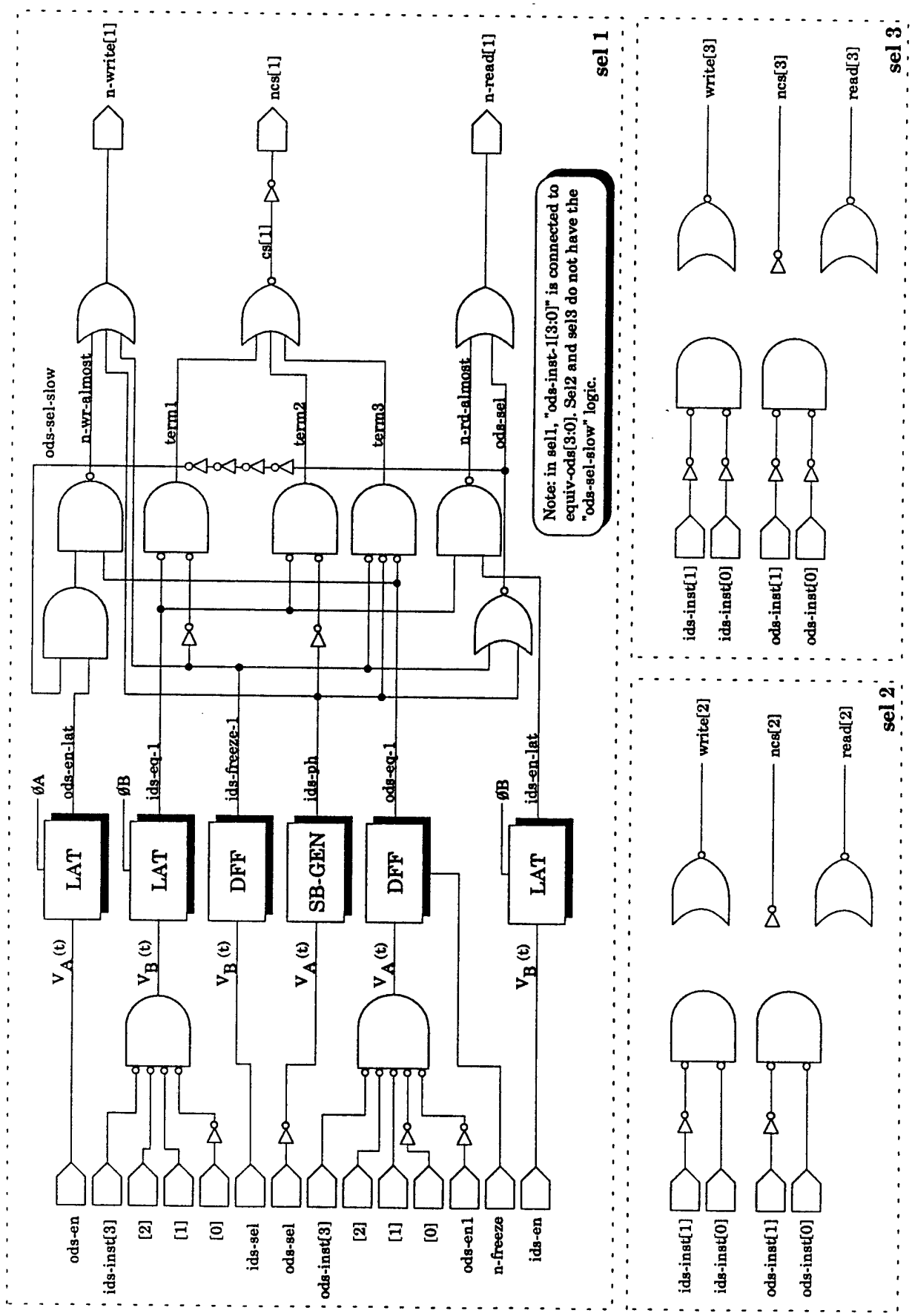


dr-ctrl (page 1 of 2)



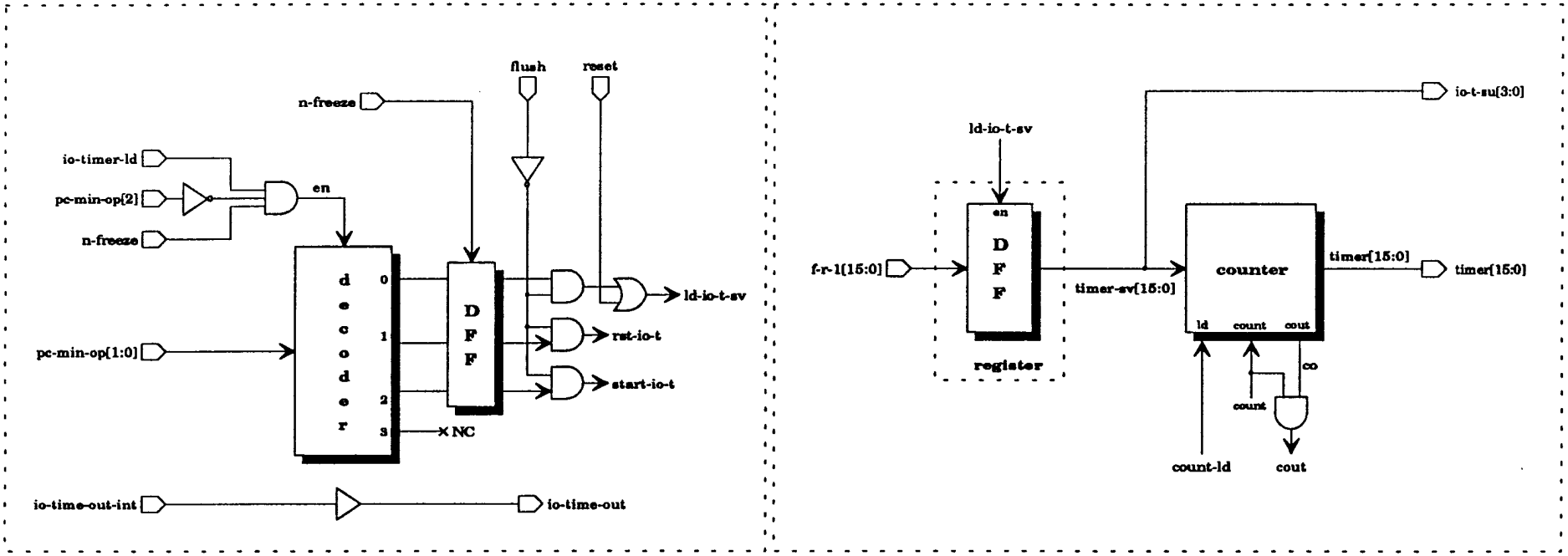
dr-ctrl
(page 2 of 2)


V:\GT-VIAG\IDS-SEL.DRW
ids-sel
ids-freeze-1
ids-ph
PHASE-A
D F F
SB-gen
en
Vb(t)
Va(t)
ids-freeze
ods-freeze
reset
flush
n-freeze-out
valid-intr-pulse
sample
hold
n-freeze
n-guard-out
reset-in
flush-in
n-freeze
vip-in
sample-int
hold-int
n-guard
n-guard
io-mod
ids-sel


sel 1
n-write[1]
ncs[1]
n-read[1]
ods-sel-slow
n-wr-almost
cs[1]
term1
term2
term3
n-rd-almost
ods-sel
Note: in sel1, "ods-inst-1[3:0]" is connected to equiv-ods[3:0]. Sel2 and sel3 do not have the "ods-sel-slow" logic.
øA
ods-en-lat
LAT
øB
ids-eq-1
LAT
ids-freeze-1
DFF
ids-ph
SB-GEN
ods-eq-1
DFF
øB
ids-en-lat
LAT
V_A (t)
V_B (t)
V_B (t)
V_A (t)
V_A (t)
V_B (t)
ods-en
ids-inst[3]
[2]
[1]
[0]
ids-sel
ods-sel
ods-inst[3]
[2]
[1]
[0]
ods-en1
n-freeze
ids-en
sel 3
write[3]
ncs[3]
read[3]
ids-inst[1]
ids-inst[0]
ods-inst[1]
ods-inst[0]
sel 2
write[2]
ncs[2]
read[2]
ids-inst[1]
ids-inst[0]
ods-inst[1]
ods-inst[0]
iomod
sel1,sel2,sel3

input: io-timer-ld, reset, so-intr-dis, si-intr-dis, ao-intr-dis, ai-intr-dis, n-freeze, n-valid-intr, f-r-1[15:0], pc-min-op[0]

output: io-timer[15:0], io-time-out

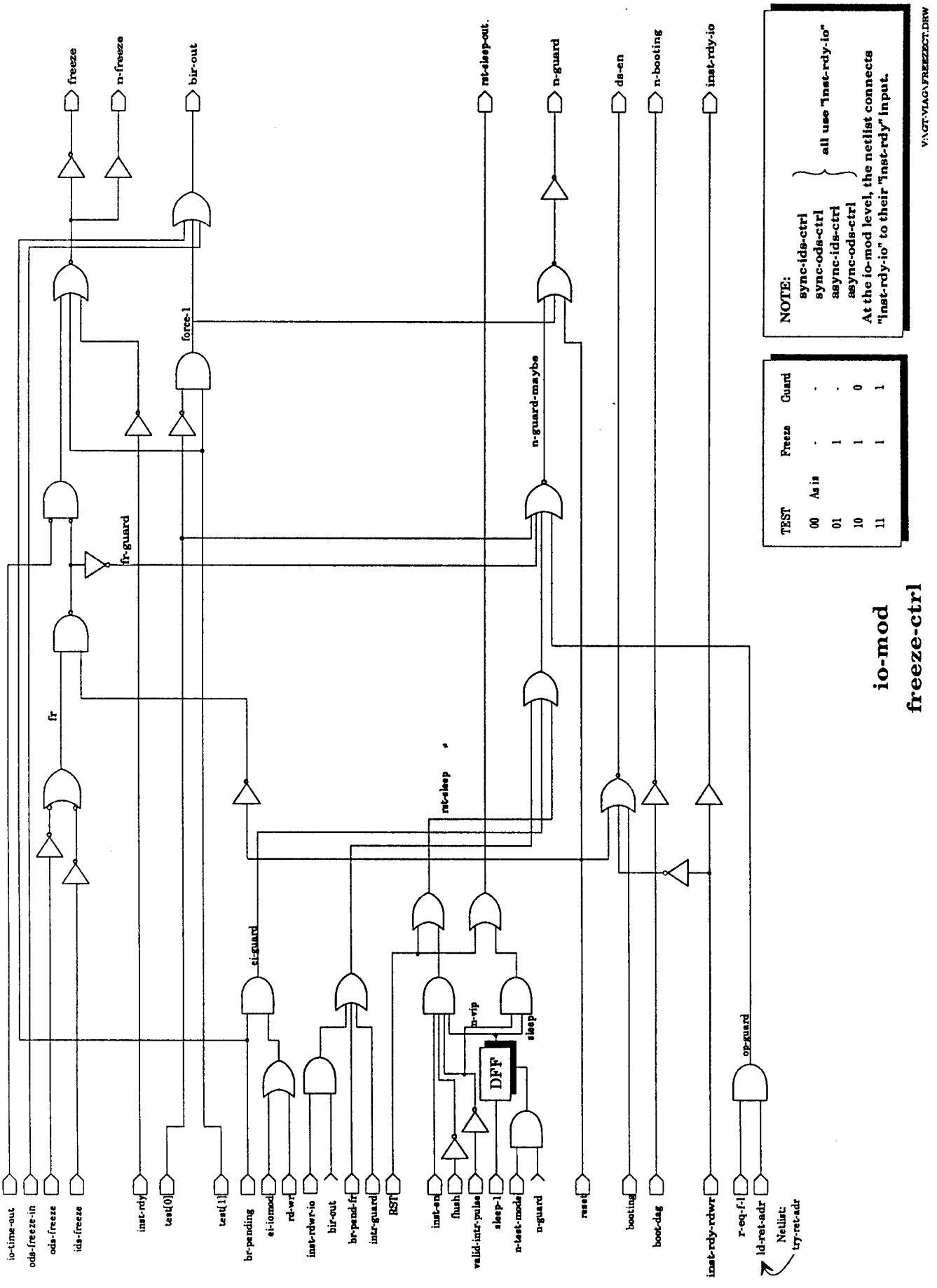


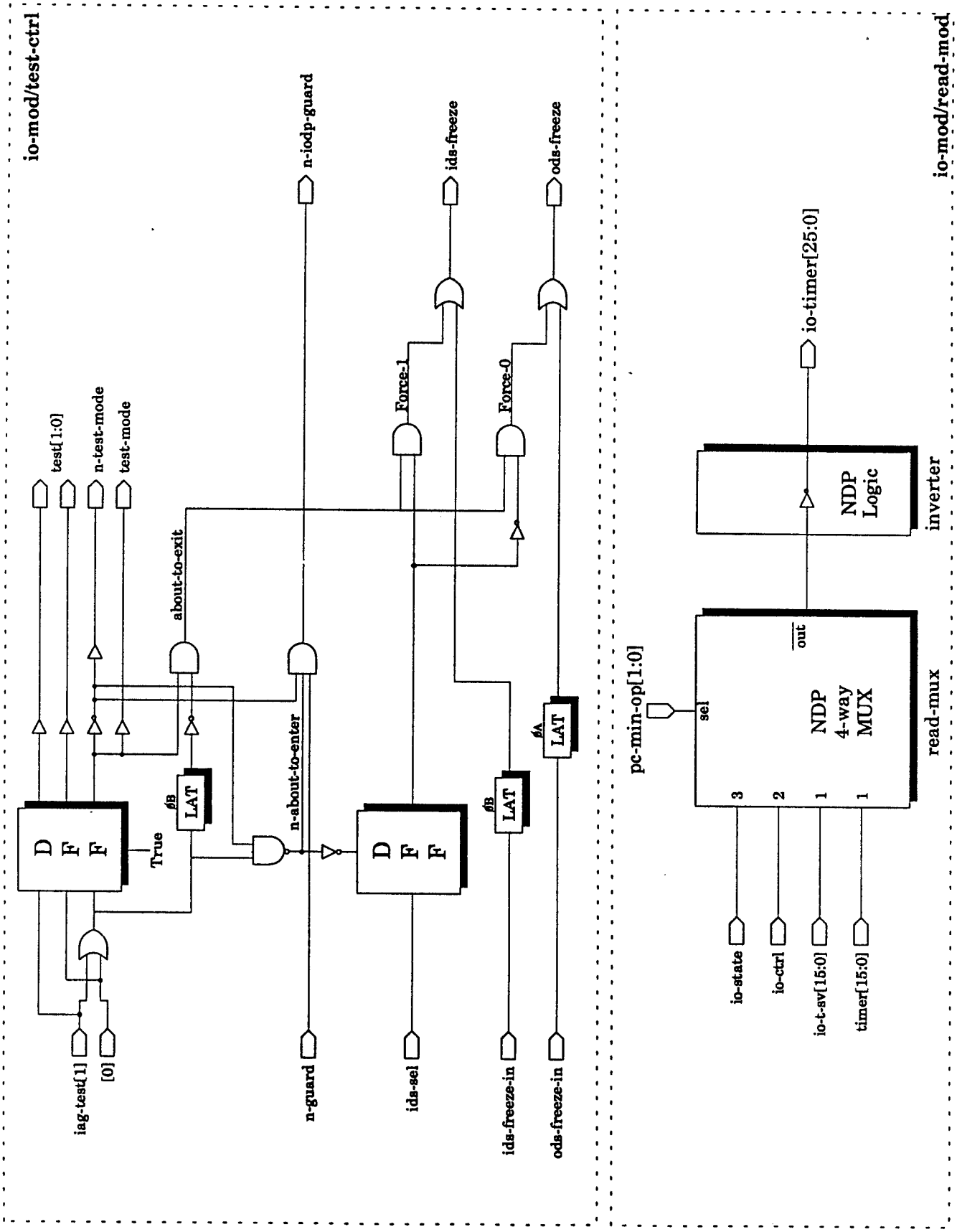
register:

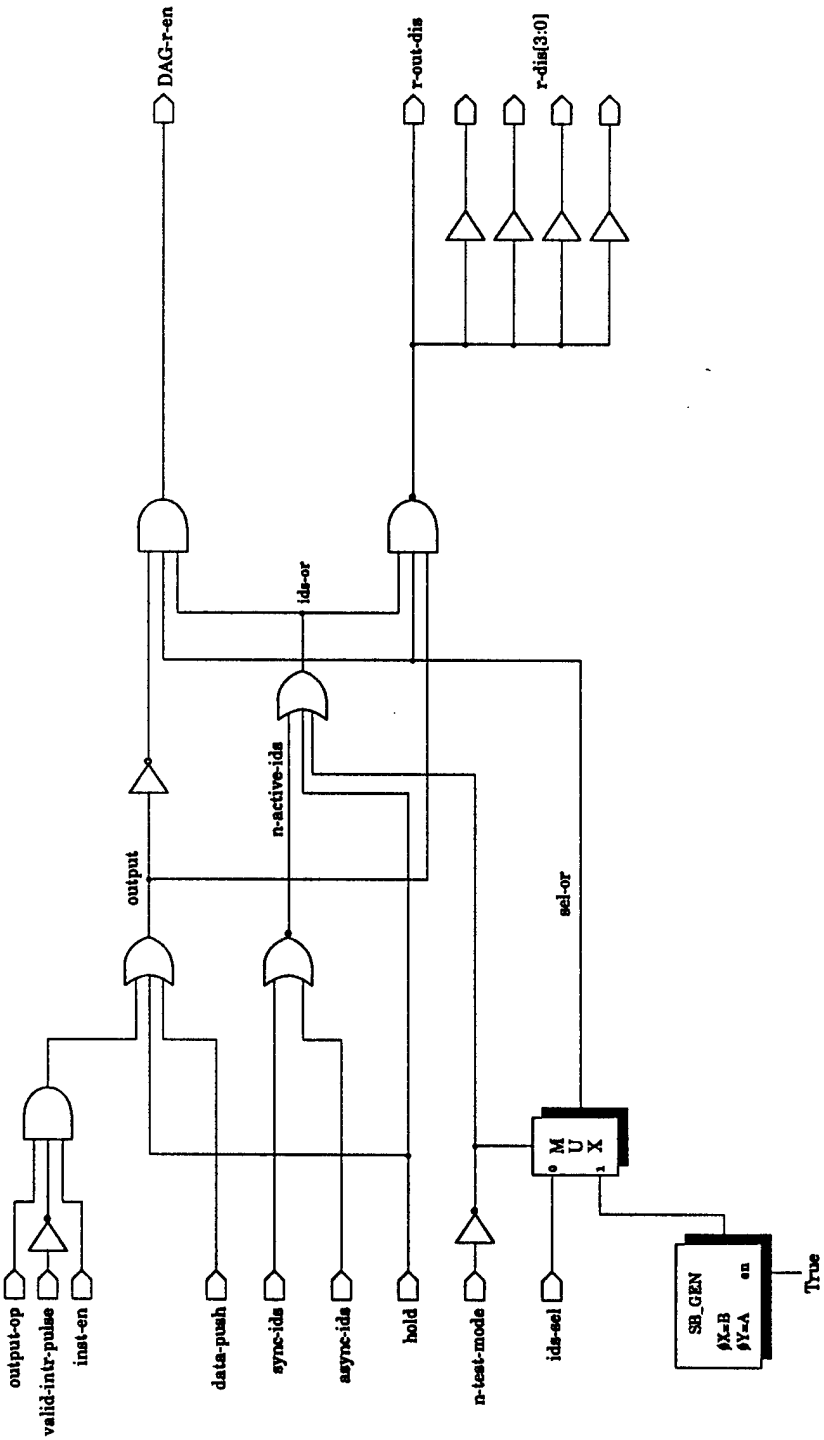
- **count-ld** = n-freeze * ~start-io-t-set
- **io-time-out-int**
  - set, if cout
  - reset, if (reset + rst-io-t)
- **start-io-t-set**
  - set, if start-io-t
  - reset, if (ld-io-t-sv + reset + rst-io-t)
- **count** = ~count-ld * n-test-mode

time-out

V:\GT-VIAG\TIME-OUT.DRW

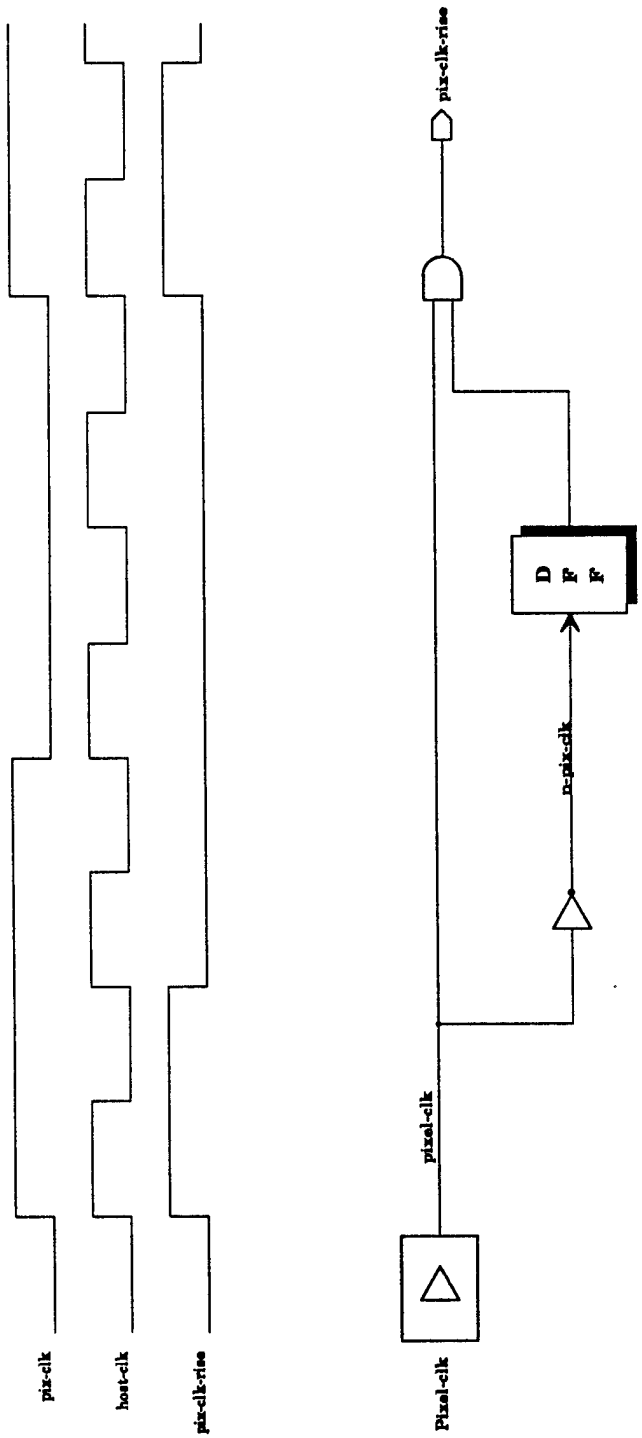

freeze
n-freeze
bir-out
nt-sleep-out
n-guard
ds-en
n-booting
inst-rdy-io
force-1
n-guard-maybe
fr-guard
fr
nt-sleep
si-guard
n-rip
sleep
DFF
op-guard
io-time-out
ods-freeze-in
ods-freeze
ids-freeze
inst-rdy
test[0]
test[1]
br-pending
si-iomod
rd-wr
inst-rdwr-io
bir-out
br-pend-fr
intr-guard
RST
inst-en
flush
valid-intr-pulse
sleep-1
n-test-mode
n-guard
reset
booting
boot-dag
inst-rdy-rdwr
r-seq-f-1
id-ret-adr
Netlist:
try-ret-adr
TEST
Freeze
Guard
00
As is
-
-
01
1
-
10
1
0
11
1
1
NOTE:
sync-ids-ctrl
sync-ods-ctrl
async-ids-ctrl
async-ods-ctrl
all use "inst-rdy-io"
At the io-mod level, the netlist connects
"inst-rdy-io" to their "inst-rdy" input.
io-mod
freeze-ctrl
V:\GT-VIAG\FREEZECT.DRW


io-mod/test-ctrl
test[1:0]
n-test-mode
test-mode
about-to-exit
n-iodp-guard
ids-freeze
ods-freeze
Force-1
Force-0
D F F
True
ϕB LAT
n-about-to-enter
ϕA LAT
iag-test[1]
[0]
n-guard
ids-sel
ids-freeze-in
ods-freeze-in
io-mod/read-mod
io-timer[25:0]
NDP Logic
inverter
pc-min-op[1:0]
sel
out
NDP 4-way MUX
read-mux
3
2
1
1
io-state
io-ctrl
io-t-sv[15:0]
timer[15:0]

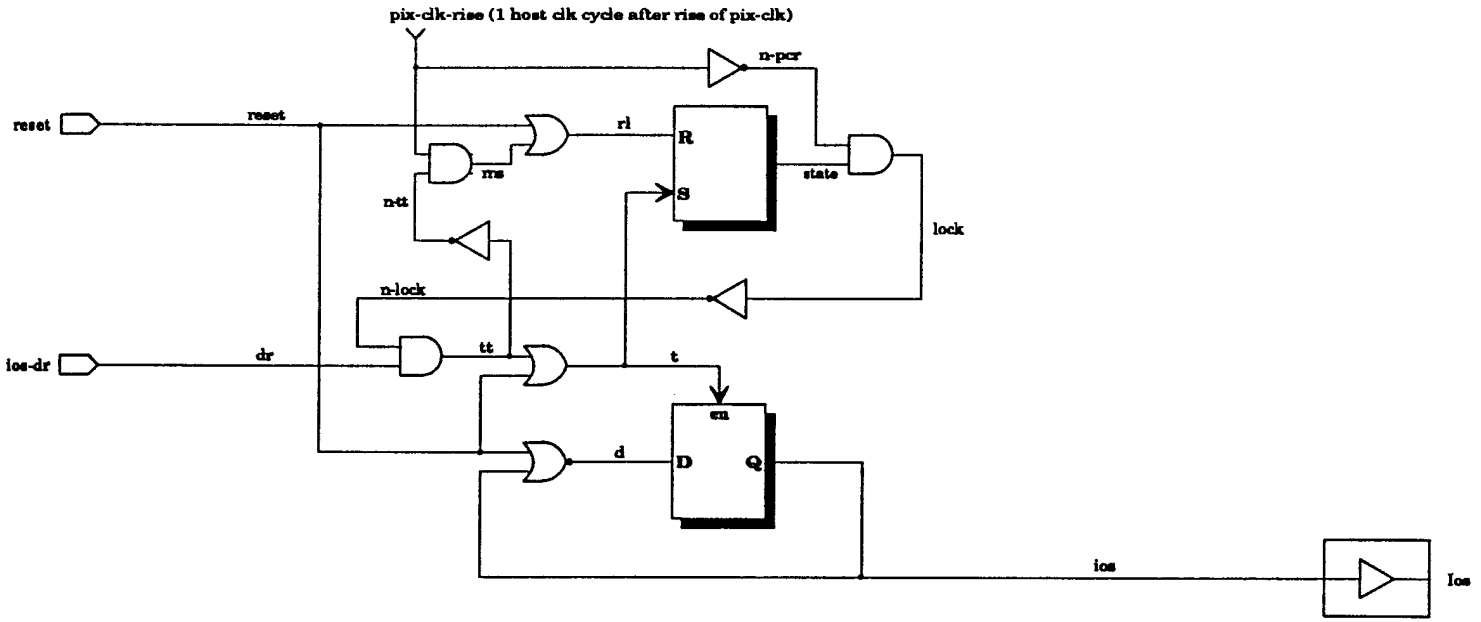

DAG-r-en
r-out-dis
r-dis[3:0]
ids-or
n-active-ids
output
sel-or
output-op
valid-intr-pulse
inst-en
data-push
sync-ids
async-ids
hold
n-test-mode
ids-sel
M
U
X
SB_GEN
$X=B
$Y=A
en
True

io-ctrl

V:\GT-VIAG\PIXCLKTR.DRW

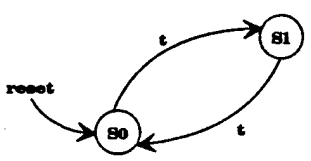


pix-clk-trans



Transition : 1. **OK if pixel-clk ↑ since the last change of state**

2. **state changes on valid Dr**



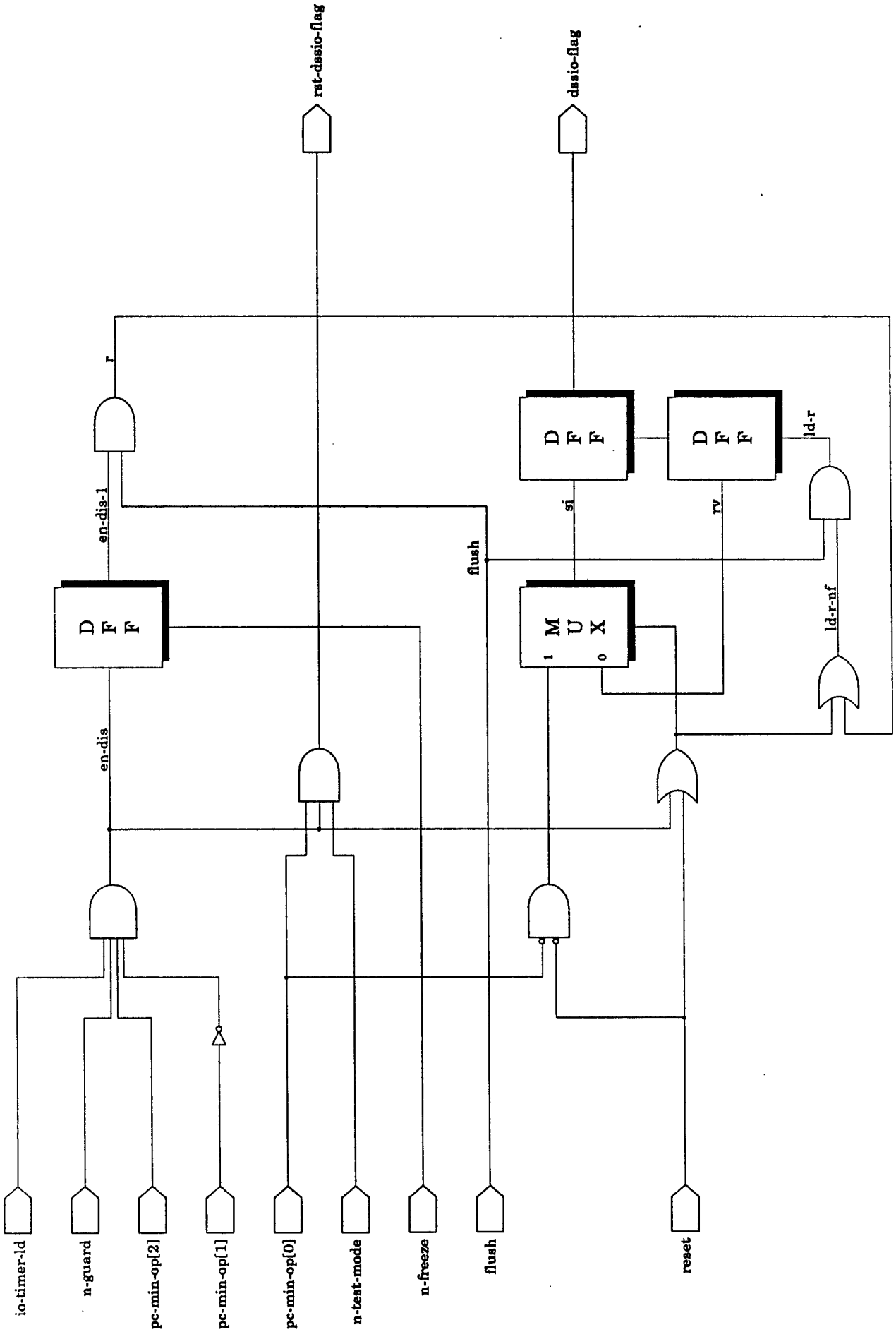
lock = (state of RSDFF)*~pix-clk-rise

t = Dr * ~Lock

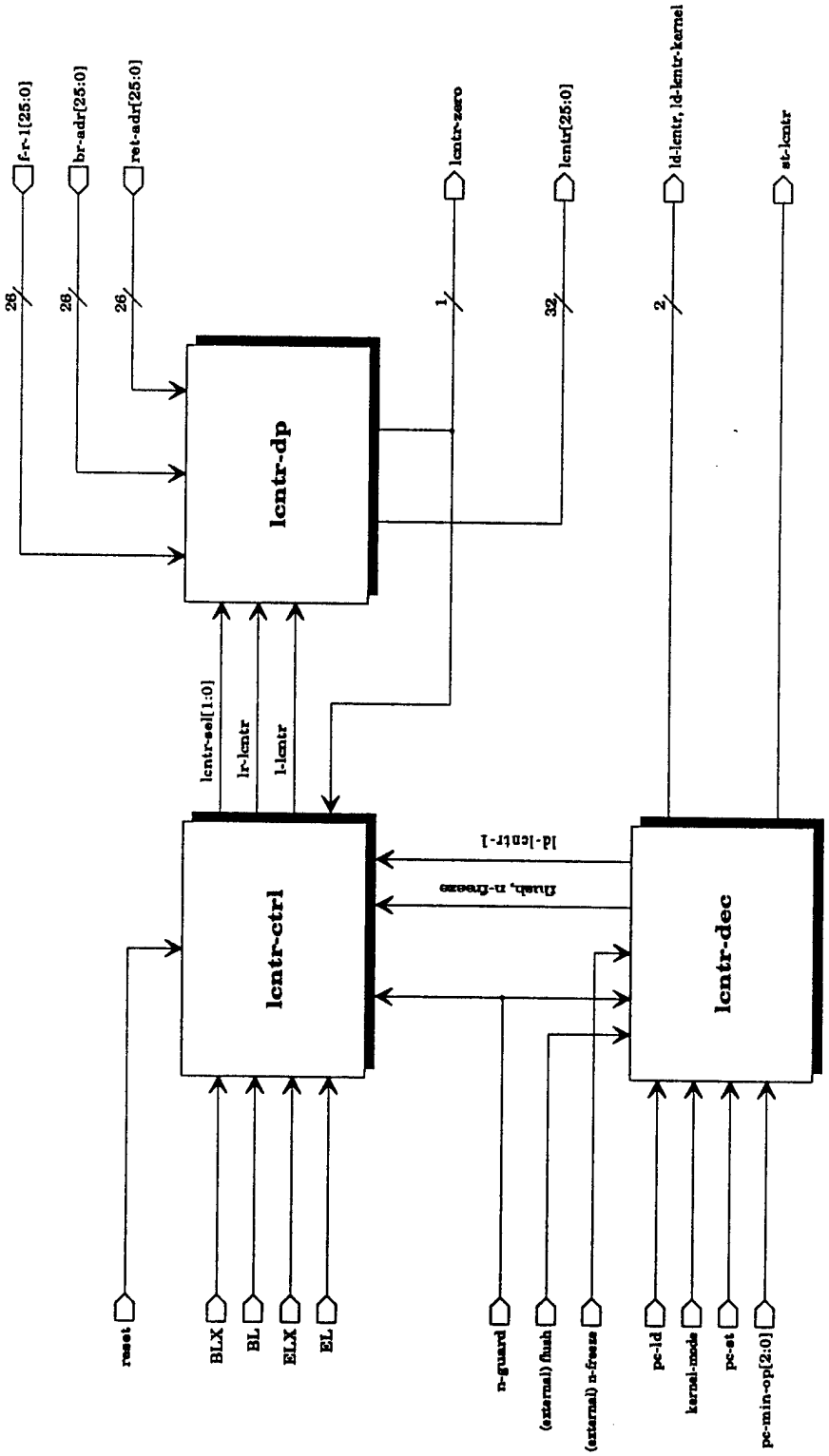
set (Lock) = t

reset (Lock) = ↑ pixel-clk*~t

ios-ctrl

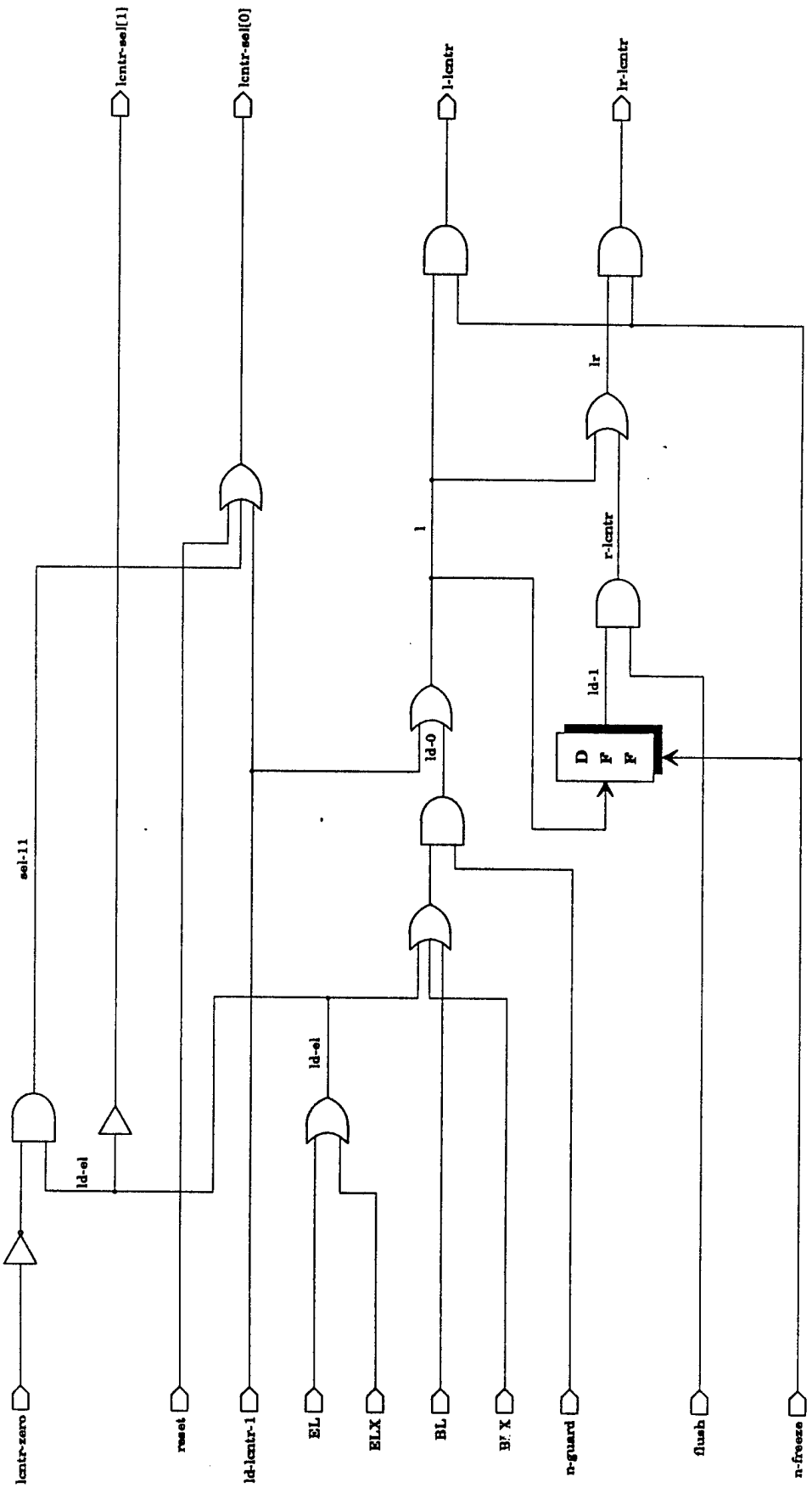


dssio-flag-ctrl



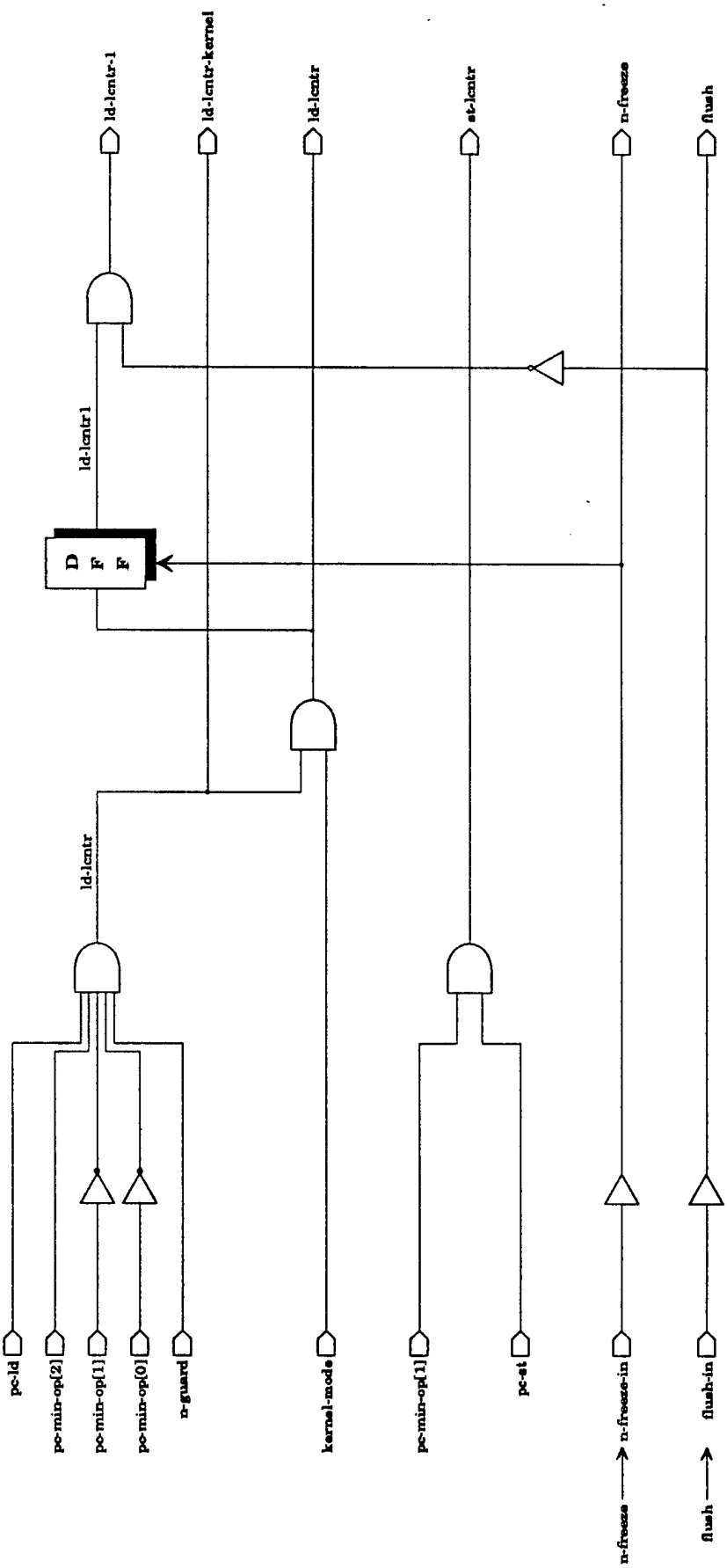
lcntr-mod

V:\GT-VIAG\LCNTR-MD.DRW



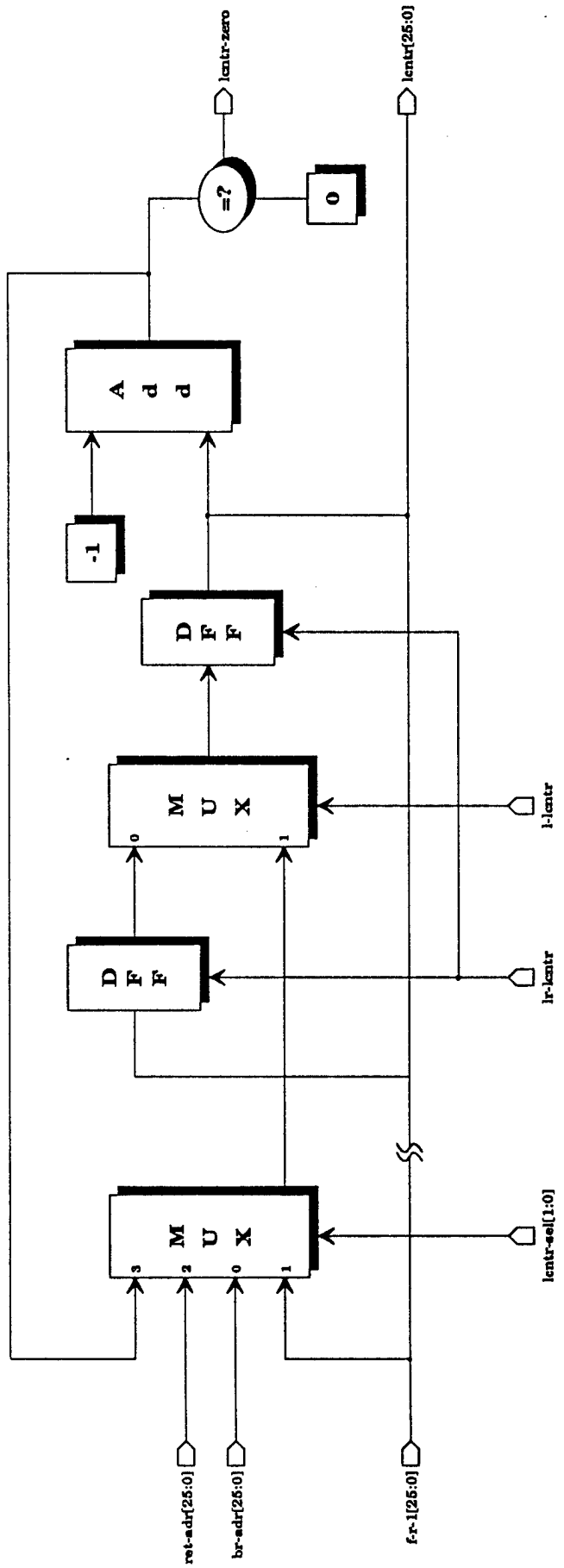
V:\GT-VIAG\LCNTR-CT.DRW

lcntr-ctrl



V:\GT-VIAG\LCNTR-DC.DSW

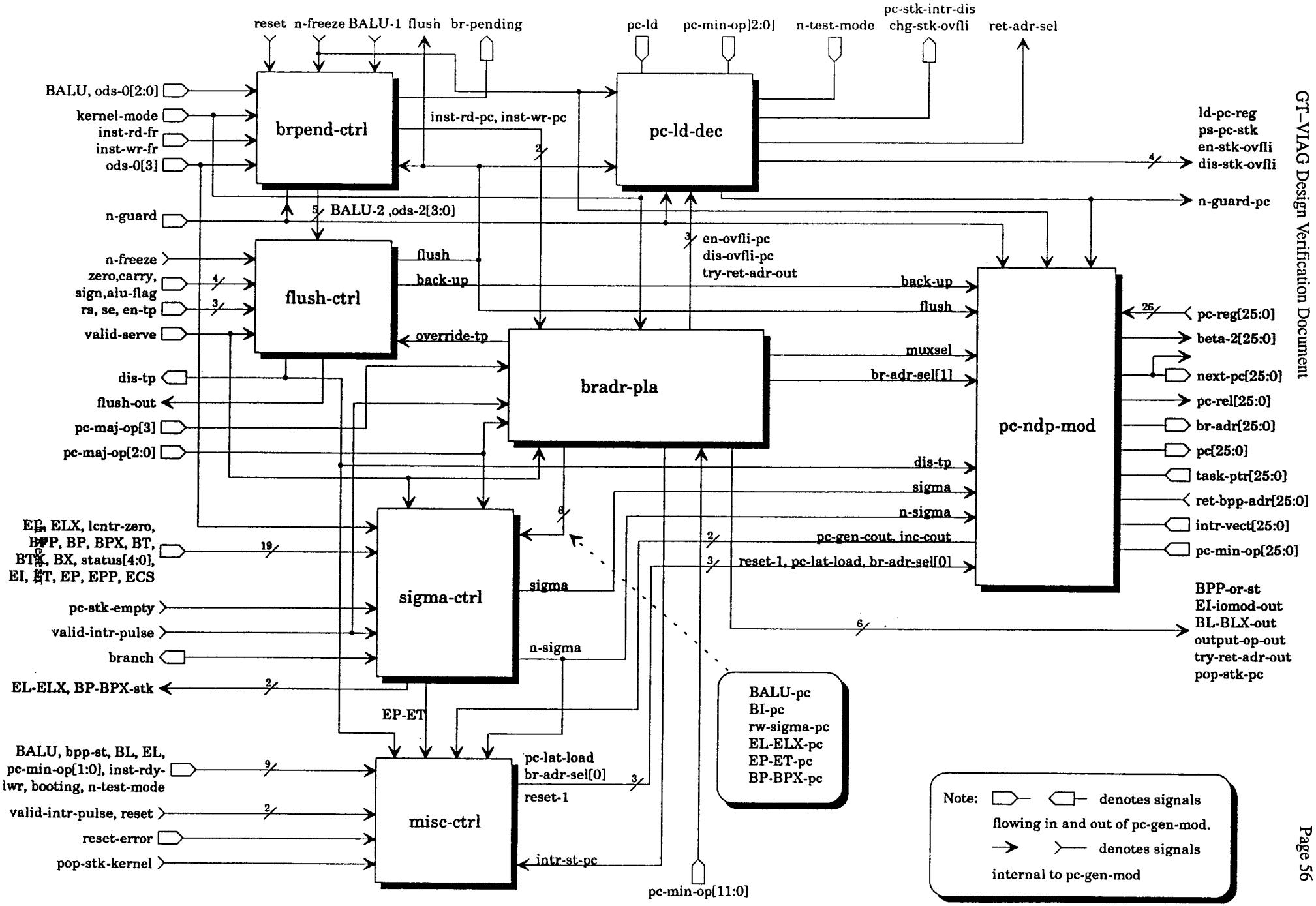
lcntr-dec



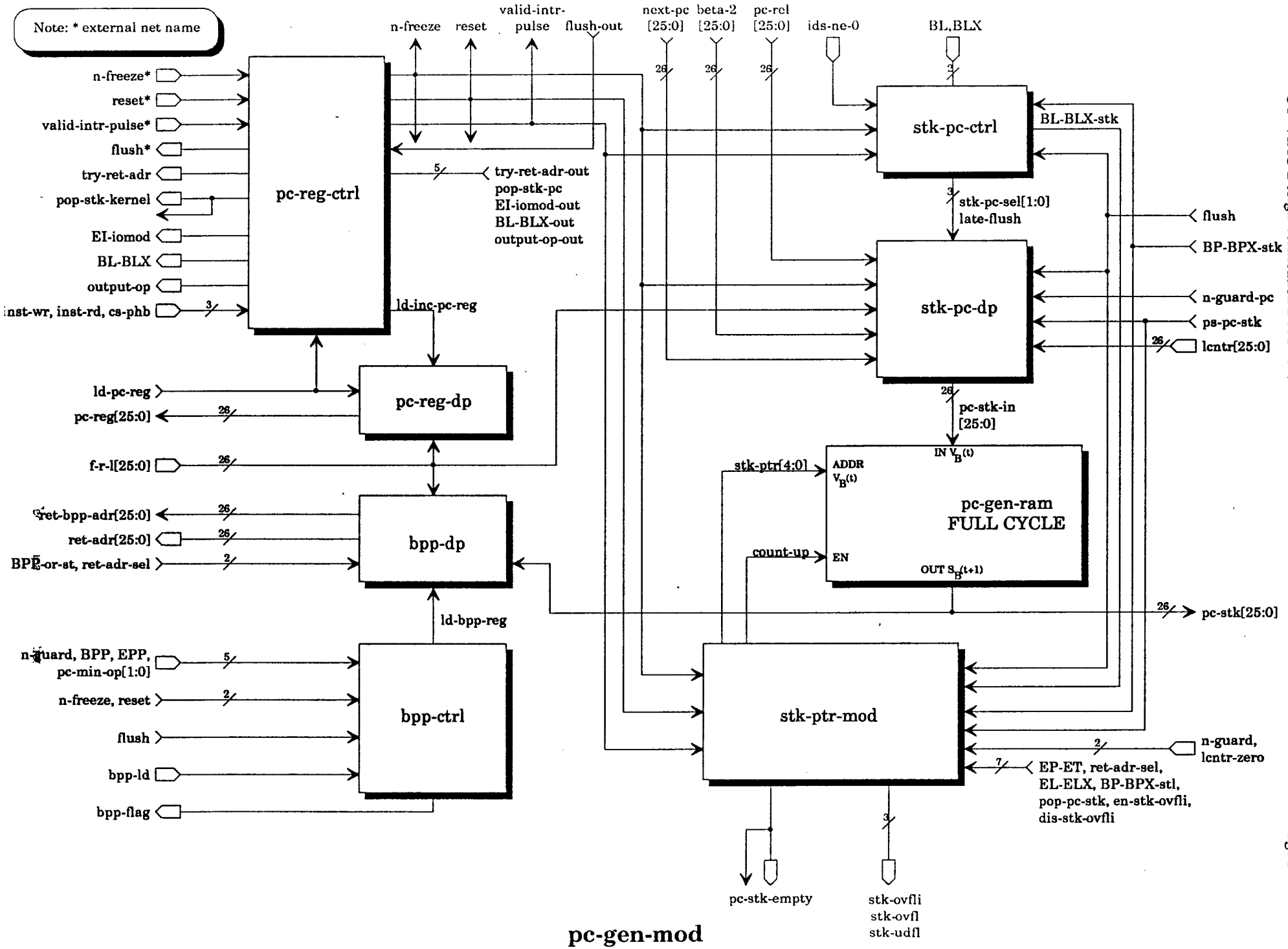
lcntr-sel	condition
0 0	BL, BLX
0 1	ld-lcntr-1, reset
1 0	(ELVELX)∧(lcntr-zero)
1 1	(ELVELX)∧(not lcntr-zero)

lcntr-dp

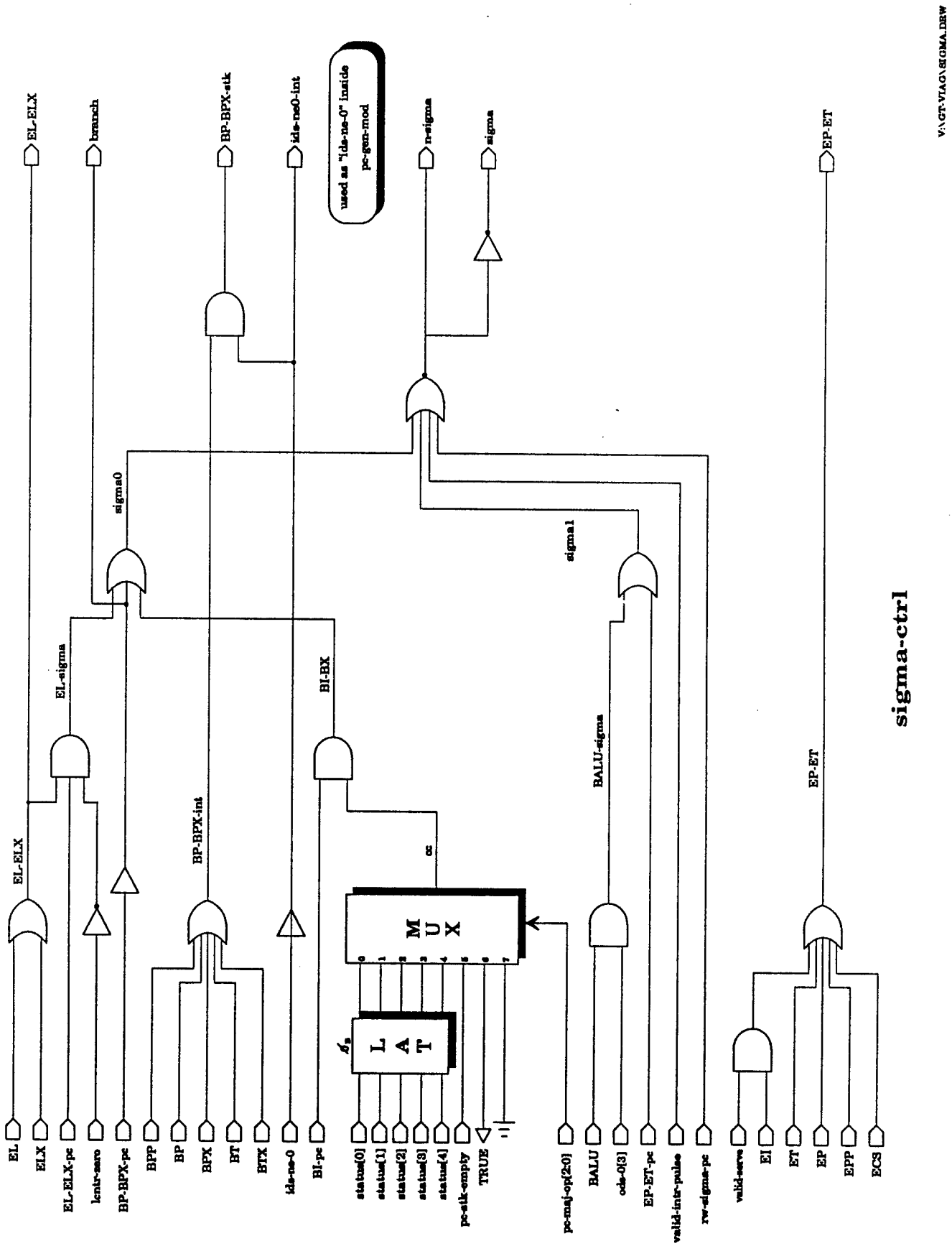
V:\GT-VIAG\LCNTR-DP.DRW

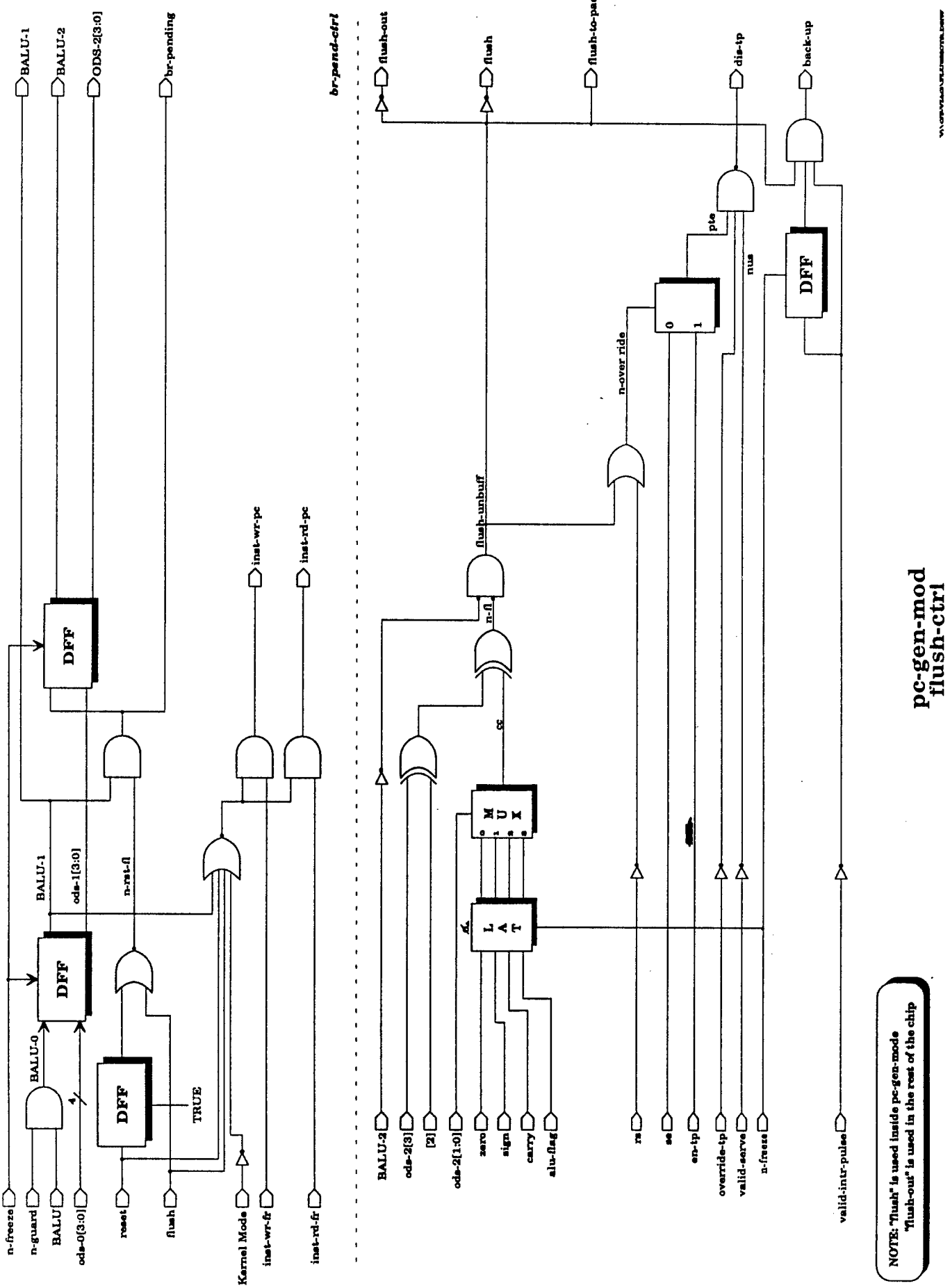


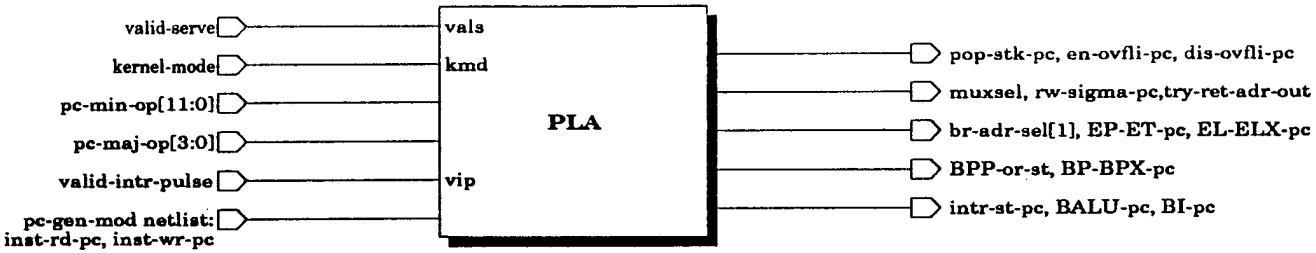
pc-gen-mod
(page 1 of 2)



pc-gen-mod
(page 2 of 2)


sigma-ctrl
V:\GT-VIAG\SIGMA.DRW
EL-ELX
branch
BP-BPX-stk
ids-ns0-int
used as "ids-ns-0" inside pc-gen-mod
n-sigma
sigma
EP-ET
sigma0
sigma1
EL-sigma
BI-BX
BP-BPX-int
BALU-sigma
MUX
LAT
EL
ELX
EL-ELX-pc
lcntr-zero
BP-BPX-pc
BPP
BP
BPX
BT
BTX
ids-ns-0
BI-pc
status[0]
status[1]
status[2]
status[3]
status[4]
ps-stk-empty
TRUE
pc-maj-op[2:0]
BALU
cds-0[3]
EP-ET-pc
valid-instr-pulse
rw-sigma-pc
valid-serve
EI
ET
EP
EPP
ECS


pc-gen-mod
flush-ctrl
BALU-1
BALU-2
ODS-2[3:0]
br-pending
br-pend-ctrl
flush-out
flush
flush-to-pad
dis-tp
back-up
DFF
DFF
DFF
BALU-1
ods-1[3:0]
n-rst-fl
BALU-0
TRUE
inst-wr-pc
inst-rd-pc
flush-unbuff
n-fl
n-over ride
pte
nus
MUX
LAT
ss
n-freeze
n-guard
BALU
ods-0[3:0]
reset
flush
Kernel Mode
inst-wr-fr
inst-rd-fr
BALU-2
ods-2[3]
[2]
ods-2[1:0]
zero
sign
carry
alu-flag
rs
se
en-tp
override-tp
valid-serve
n-freeze
valid-intr-pulse
NOTE: "flush" is used inside pc-gen-mode
"flush-out" is used in the rest of the chip



CONDITIONS

(Notice that these are the same as generated by the decoders, but without inst-en and valid-intr-pulse)

(underlined names are AND'ed with "kernel-mode")

br-adr-sel[1]

condition	value
pop-pc-stk	1
EI*valid-serve	
ET	
EP	
EPP	
ECS	
intr-st	
BPP	
bpp-st	
valid-intr-pulse	
BX	0
BPX	
BTX	
BLX	
ELX	
inst-rd	
inst-wr	
BL	
BI	
BALU	
BP	
BT	
EL	

mux-sel

condition	value
BX	0
BPX	
BTX	
BLX	
ELX	
rd-inst	
wr-inst	
BL	1
BI	
BALU	
BP	
BT	
EL	

BALU-pc = BALU

BI-pc = BI

intr-st-pc

condition	value
intr-st	1
else	0

rw-sigma-pc

condition	value
intr-st	1
inst-wr	1
BX	1
else	0

BPP-or-st

condition	value
BPP	1
bpp-st	1
else	0

EP-ET-pc

condition	value
EI*valid-serve	1
ET	
EP	
EPP	
ECS	
else	0

EL-ELX-pc

condition	value
EL	1
ELX	1
else	0

BP-BPX-pc

condition	value
BPP	1
BP	
BPX	
BT	
BTX	
else	0

try-ret-adr-out = ld-ret-adr*~valid-intr-pulse

pop-stk-pc = pop-pc-stk*~valid-intr-pulse

en-ovfli-pc = en-stk-ovfli*~valid-intr-pulse

dis-pvfli-pc = dis-stk-ovfli*~valid-intr-pulse

EI-iomod = EI*~valid-intr-pulse*valid-serve

override-tp = BL + BLX + st-pc-reg

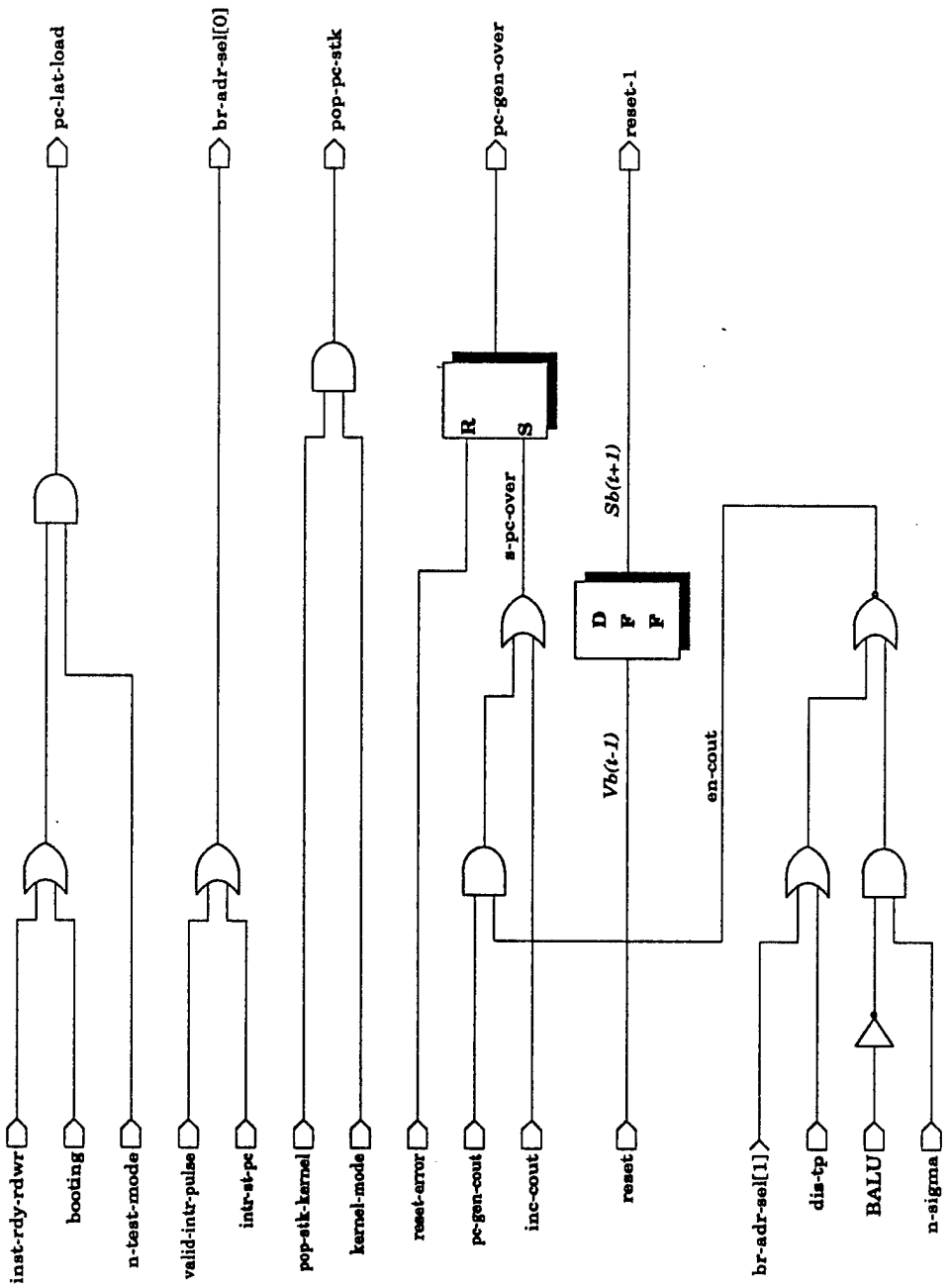
output-op = LDST*pc-min-op[7] + intr-st

BL-BLX-out = BL + BLX

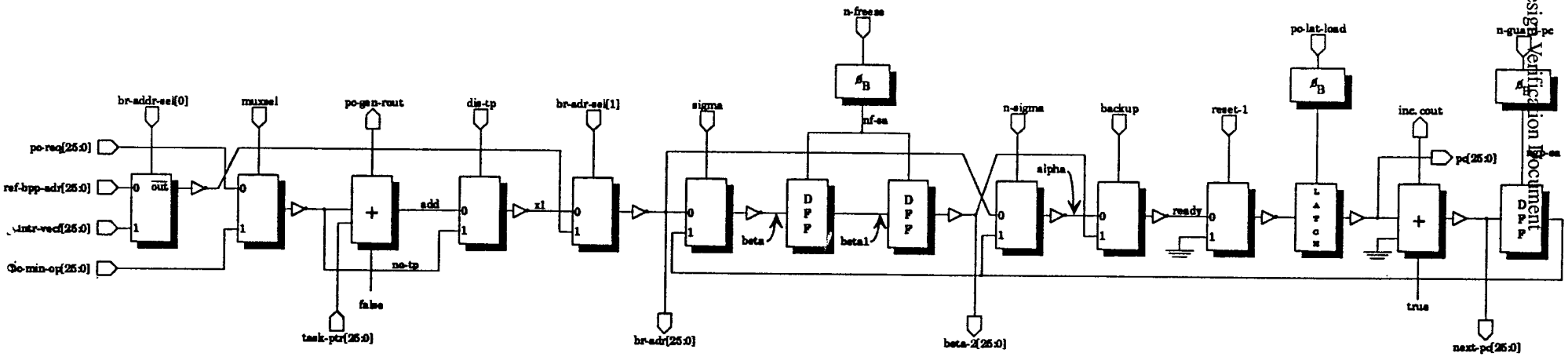
bradr-pla

V:\GT-VIAG\bradrpla.drw

V:\GT-VIAG\MISC.DRW



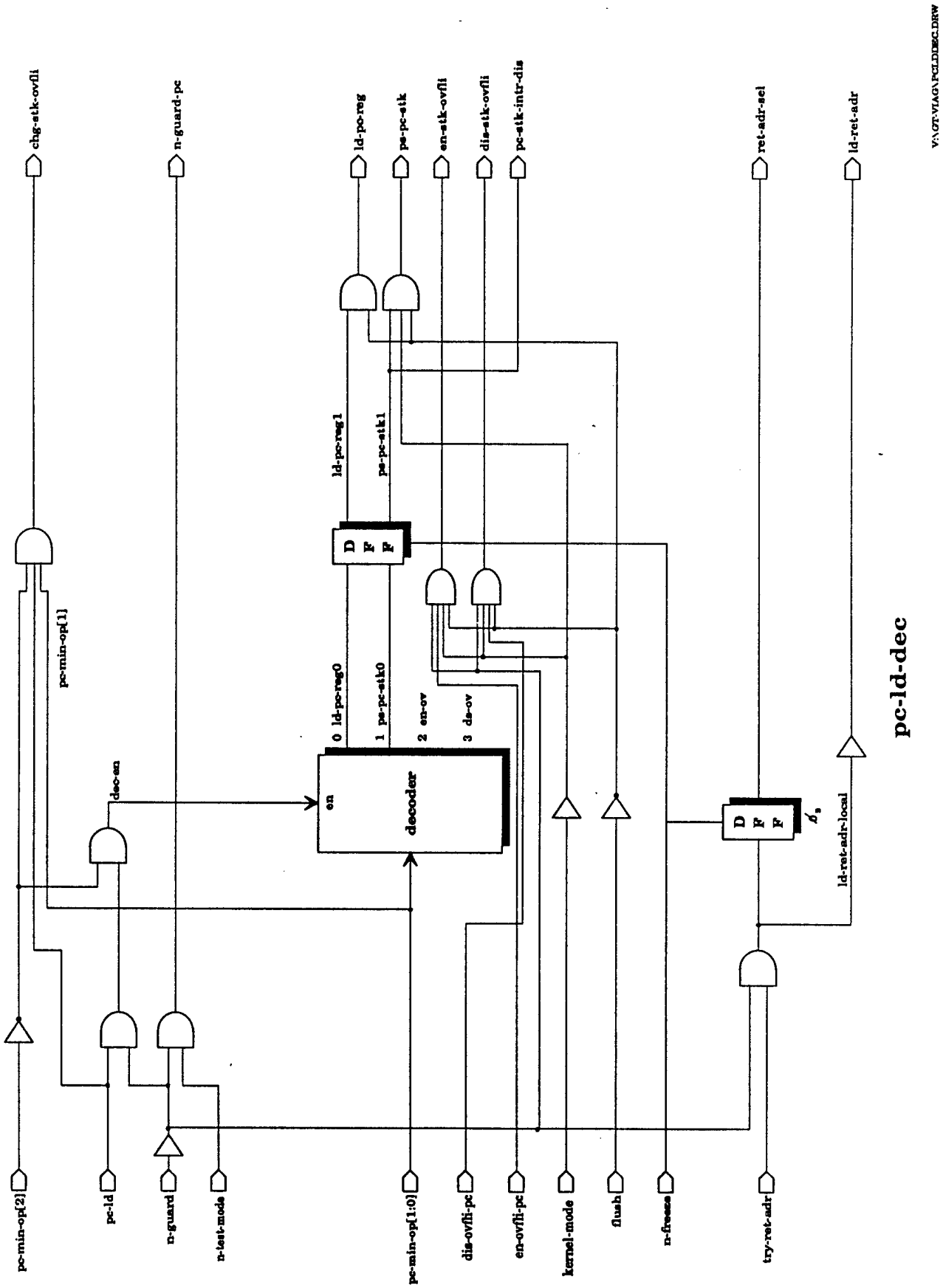
misc-ctrl

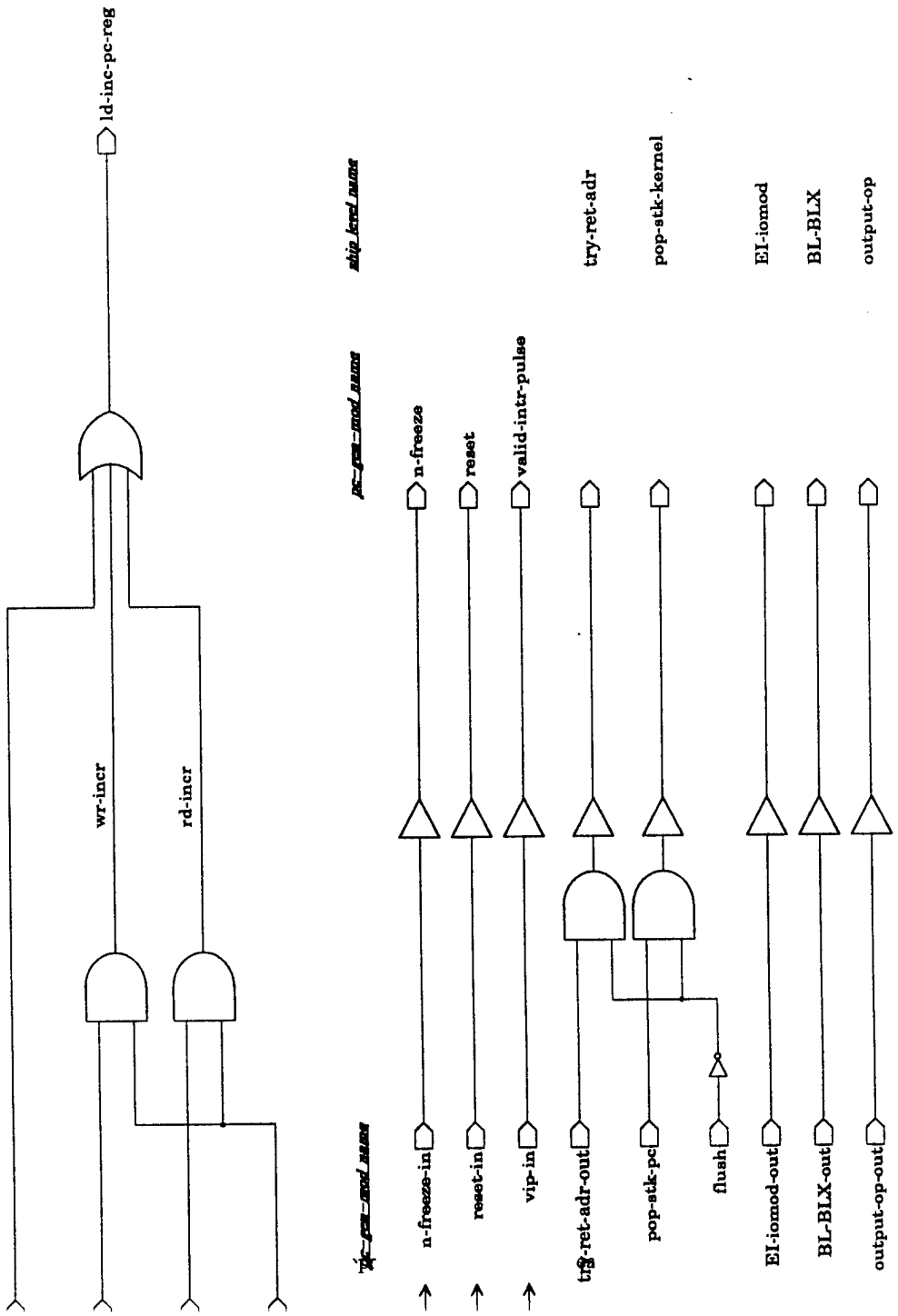


br-adr-sel		condition
0	0 (muxsel)	BX ∨ BPX ∨ BTX ∨ BLX ∨ ELX ∨ inst-wr ∨ inst-rd
0	1 (muxsel)	BI ∨ BALU ∨ BP ∨ BT ∨ EL ∨ BL
1	0	EP- ET ∨ ECS ∨ pop-pc-stk ∨ EI
1	1	valid-intr-pulse ∨ intr-st ∨ BPP ∨ bpp-st

conditions for bradr-pla

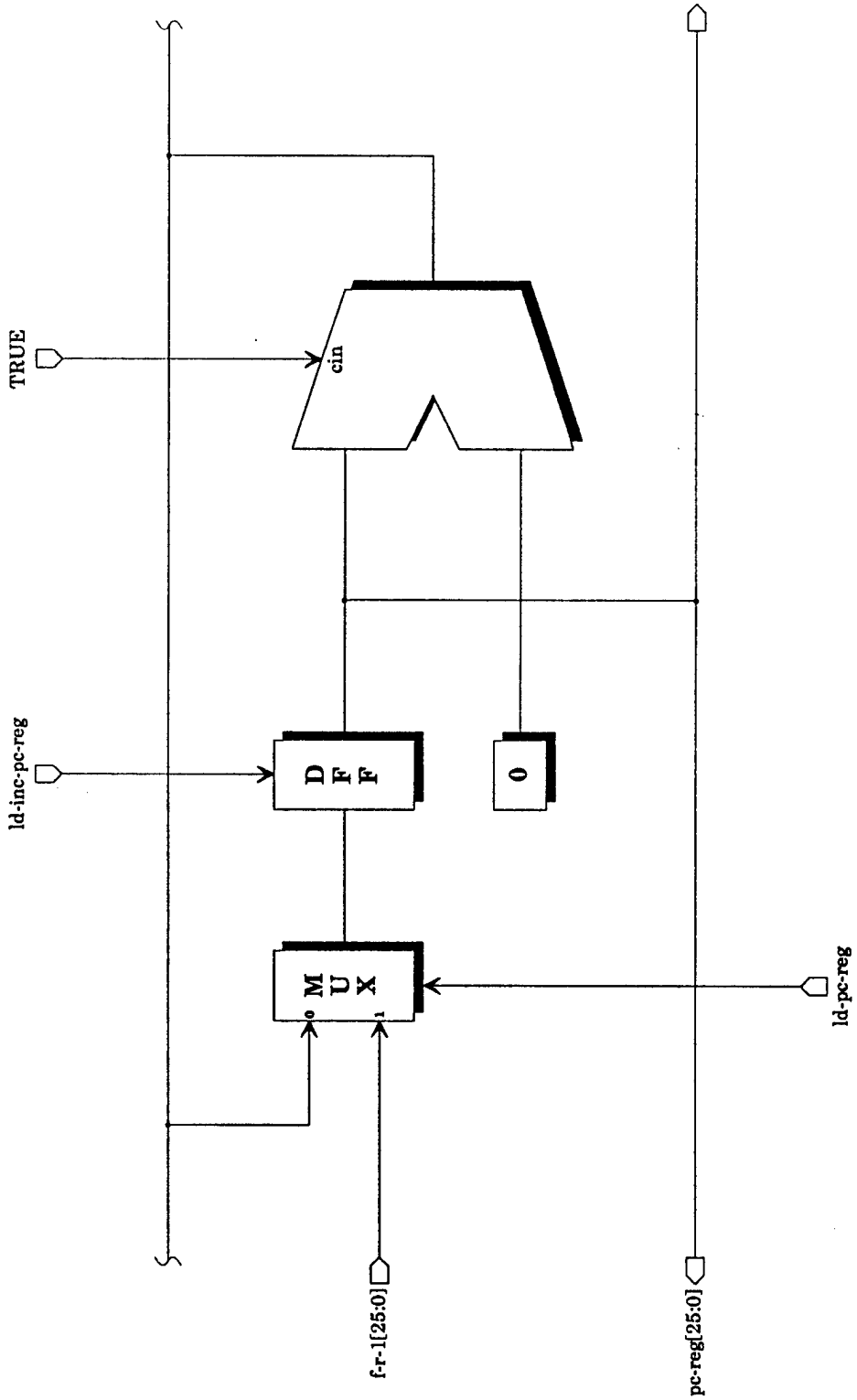
pc-ndp-mod


pc-ld-dec
V:\GT-VIAG\PCLDDEC.DRW
chg-stk-ovfli
n-guard-pc
ld-pc-reg
ps-pc-stk
en-stk-ovfli
dis-stk-ovfli
pc-stk-intr-dis
ret-adr-sel
ld-ret-adr
ld-pc-reg1
ps-pc-stk1
pc-min-op[1]
dec-en
0 ld-pc-reg0
1 ps-pc-stk0
2 en-ov
3 ds-ov
en
decoder
D F F
ld-ret-adr-local
pc-min-op[2]
pc-ld
n-guard
n-test-mode
pc-min-op[1:0]
dis-ovfli-pc
en-ovfli-pc
kernel-mode
flush
n-freeze
try-ret-adr

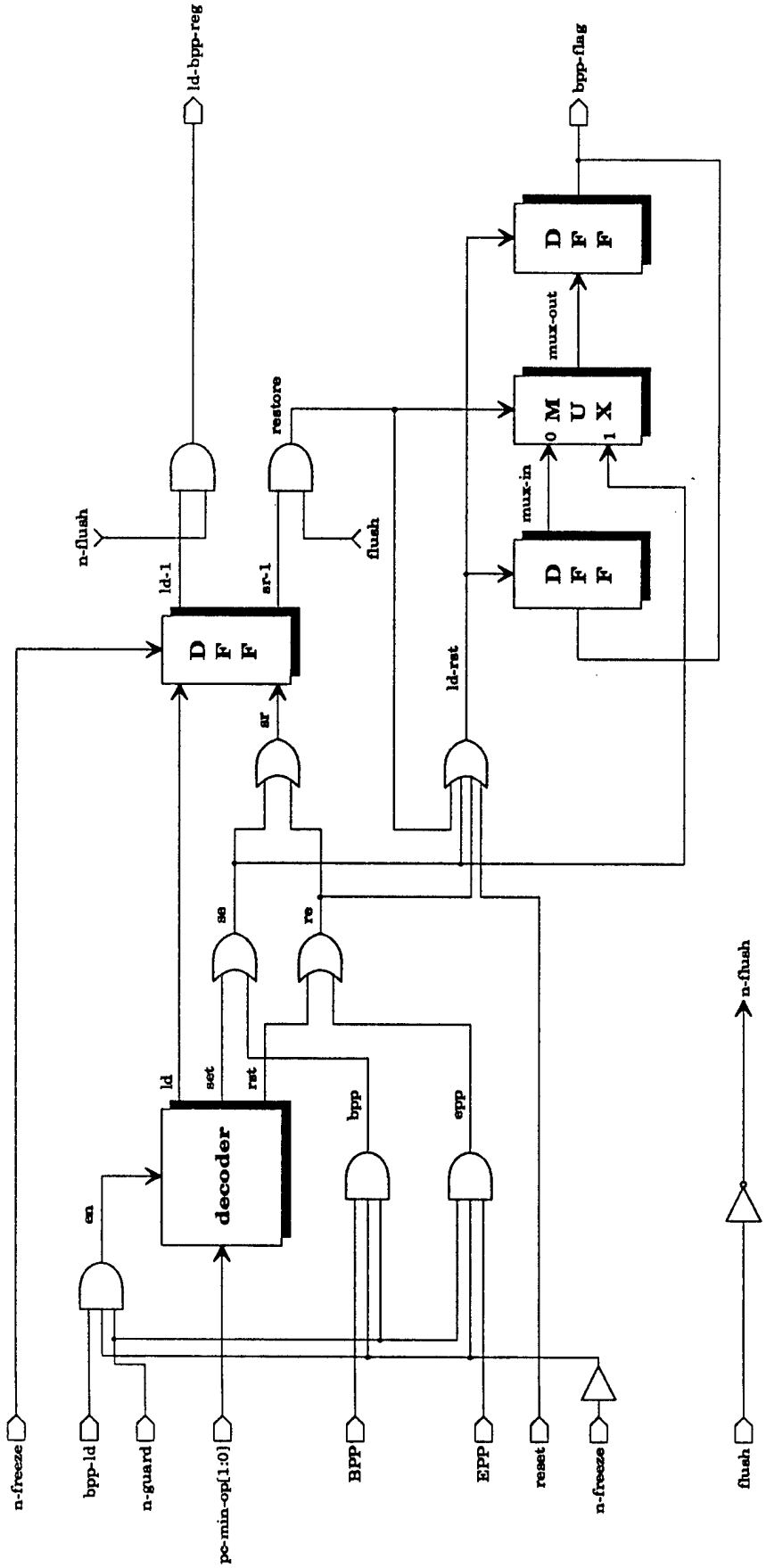


pc-gen-mod
pc-reg-ctrl

V:\GT-VIAG\PCREGCTR.DRW

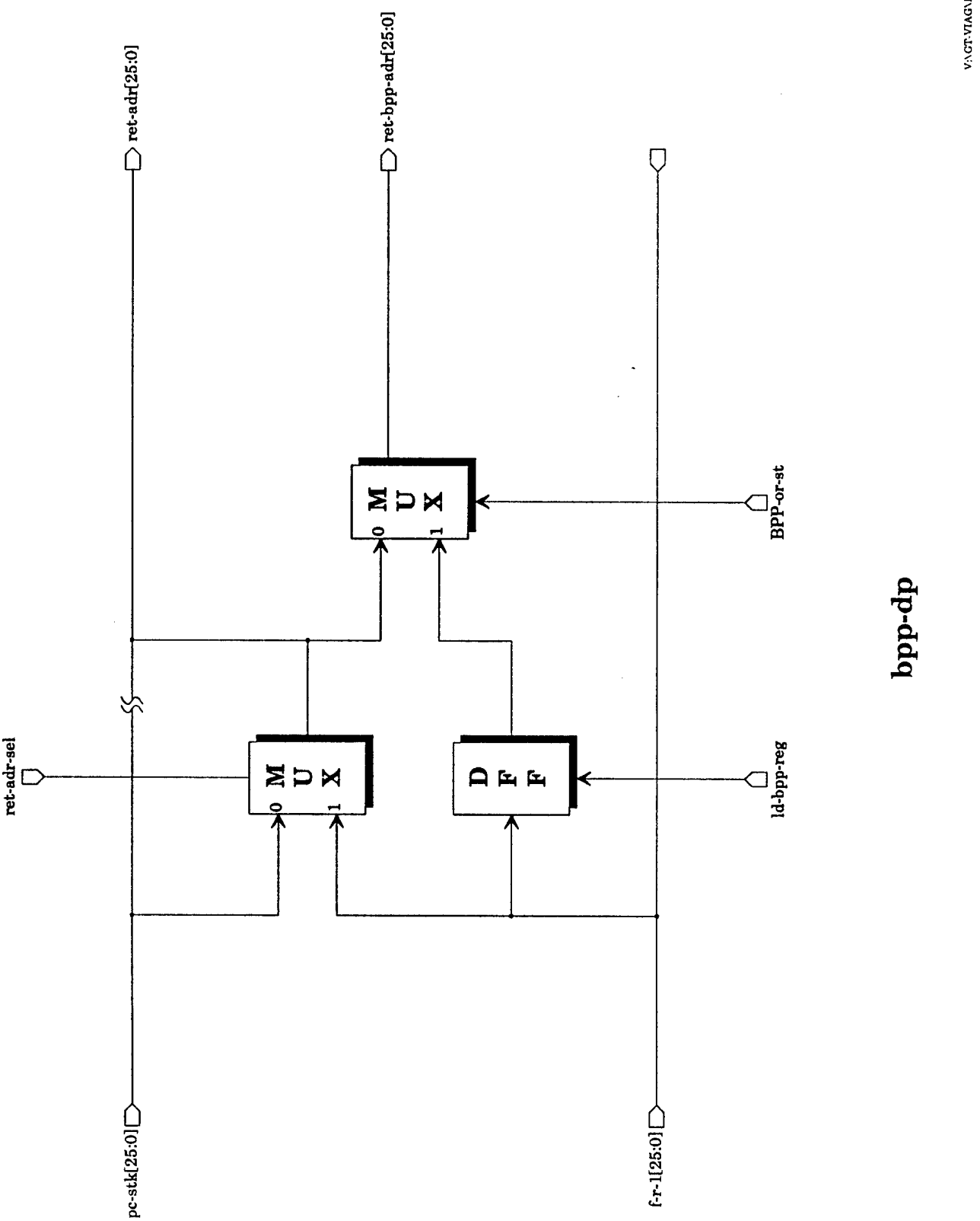

V:\GT-VIAG\PCREGDP.DRW
TRUE
cin
ld-inc-pc-reg
D
F
F
0
M
U
X
0
1
ld-pc-reg
f-r-1[25:0]
pc-reg[25:0]

pc-reg-dp

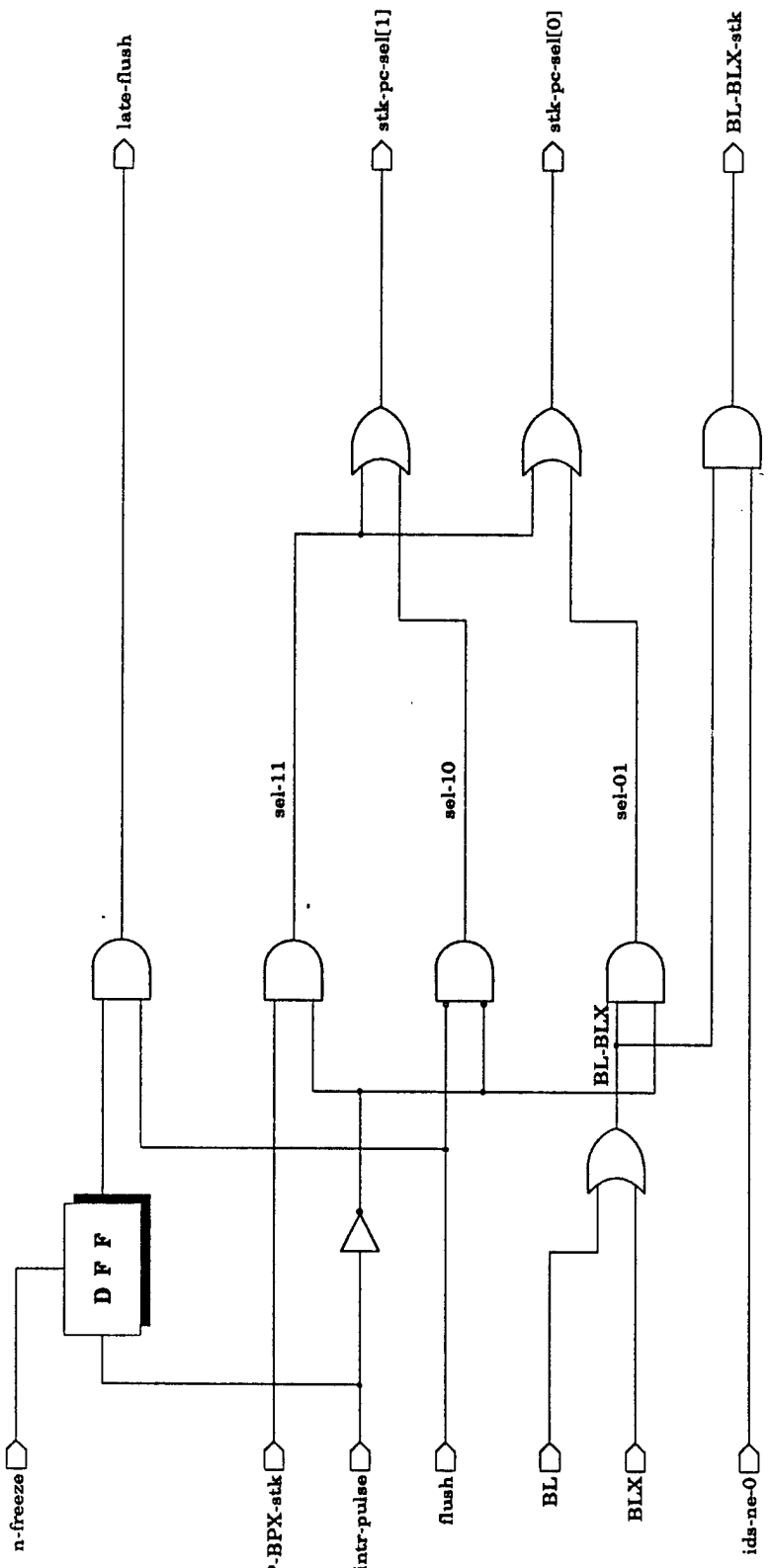


bpp-ctrl

V:\GT-VIAG\BPP-CTRL.DSW

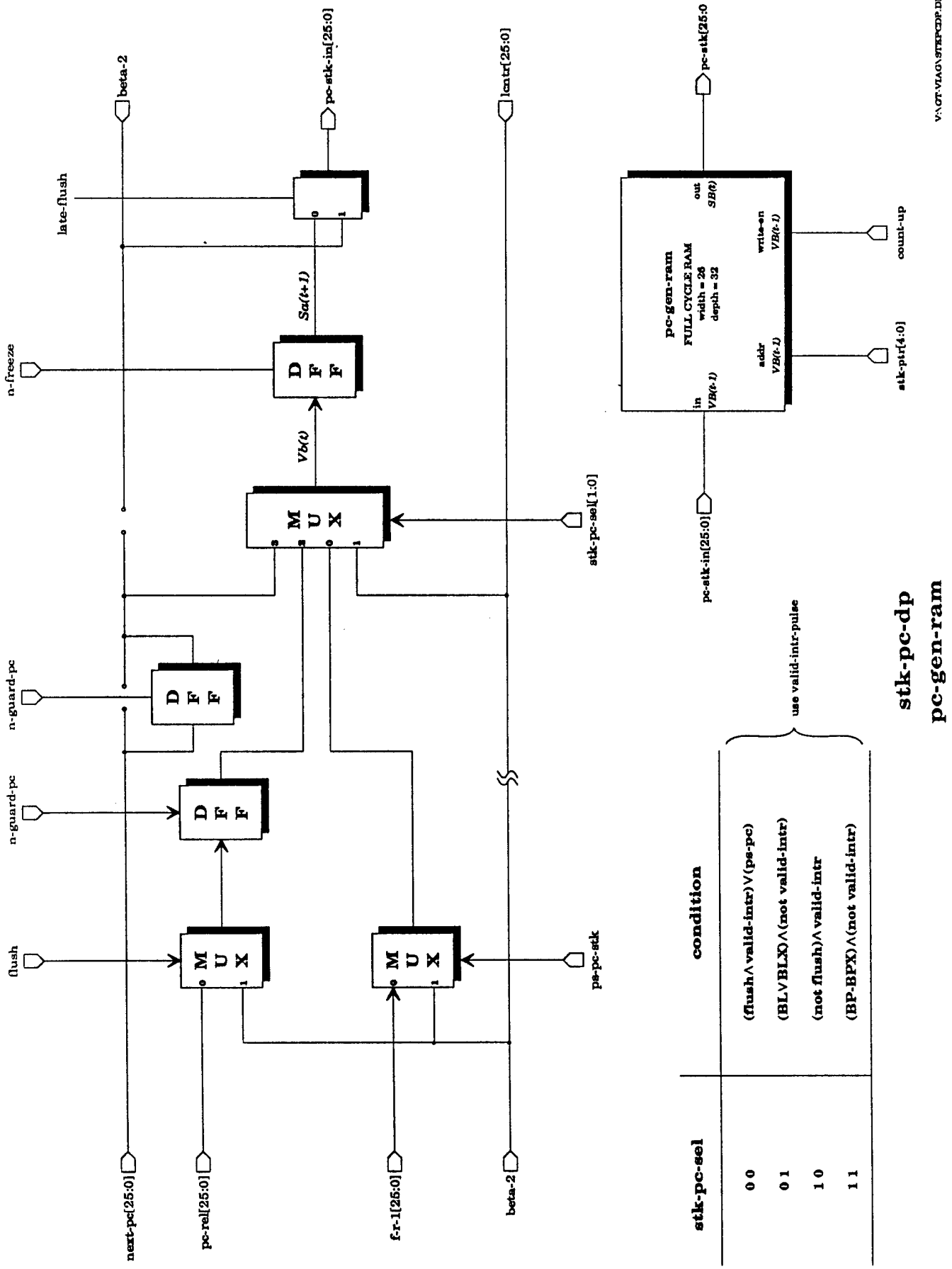

V:\GT-VIAG\BPP-DP.DRW
ret-adr[25:0]
ret-bpp-adr[25:0]
BPP-or-st
ret-adr-sel
ld-bpp-reg
pc-stk[25:0]
f-r-1[25:0]
M U X
0
1
D F F

bpp-dp



V:\GT-VIAG\STKPCCTR.DRW

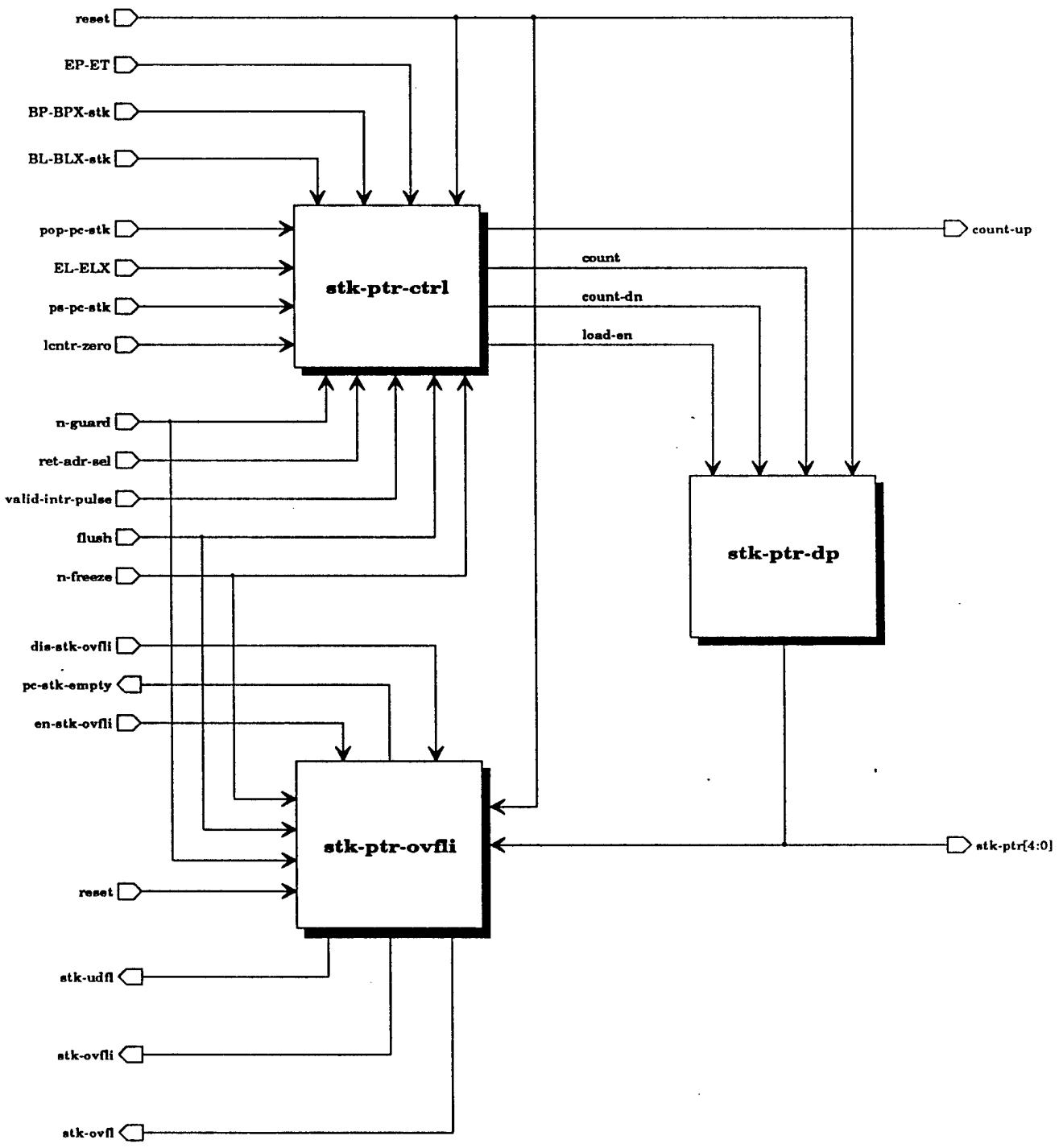
stk-pc-ctrl



stk-pc-sel	condition	
0 0	(flush∧valid-intr)∨(ps-pc)	use valid-intr-pulse
0 1	(BL∨BLX)∧(not valid-intr)	
1 0	(not flush)∧valid-intr	
1 1	(BP-BPX)∧(not valid-intr)	

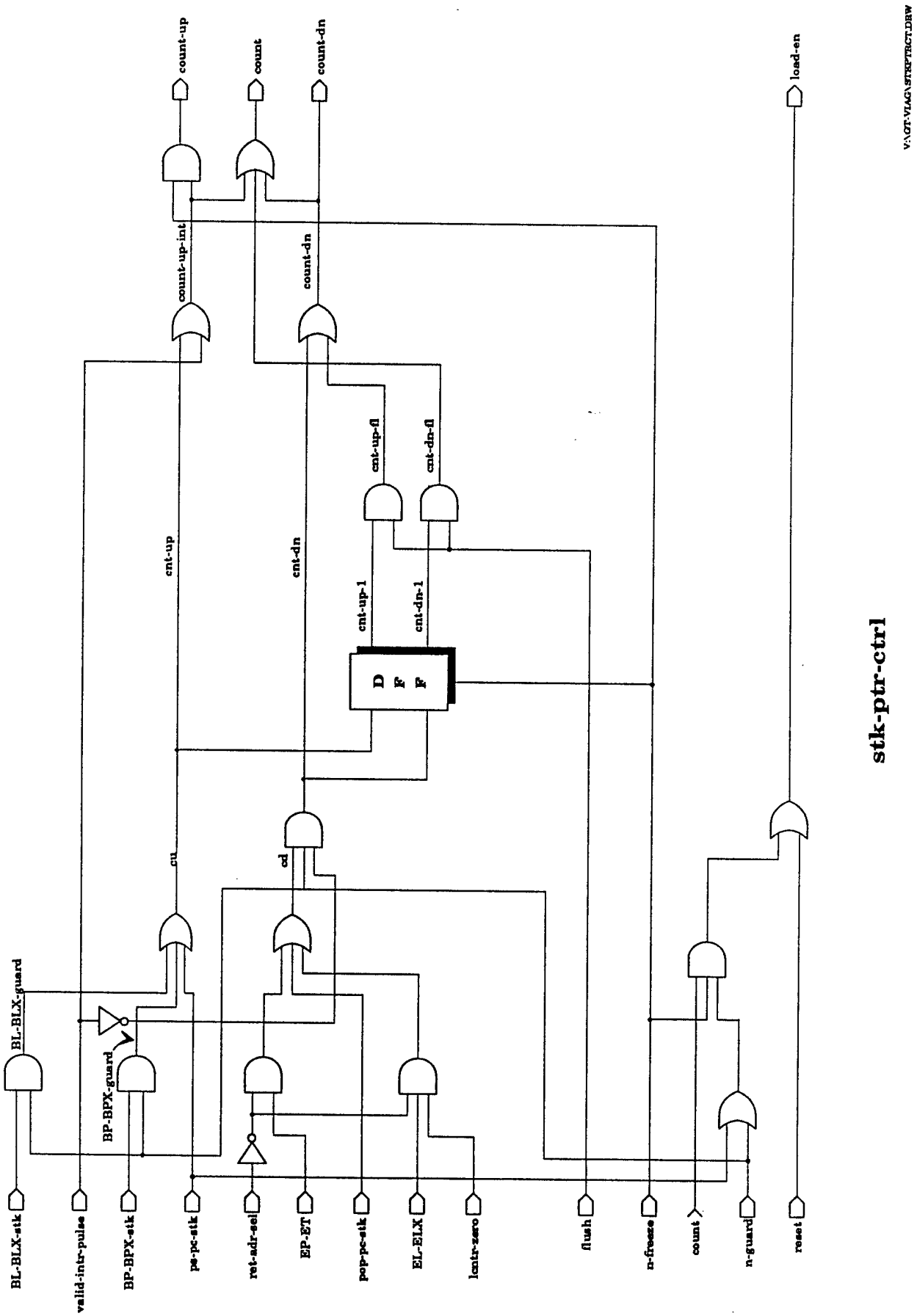
stk-pc-dp

pc-gen-ram

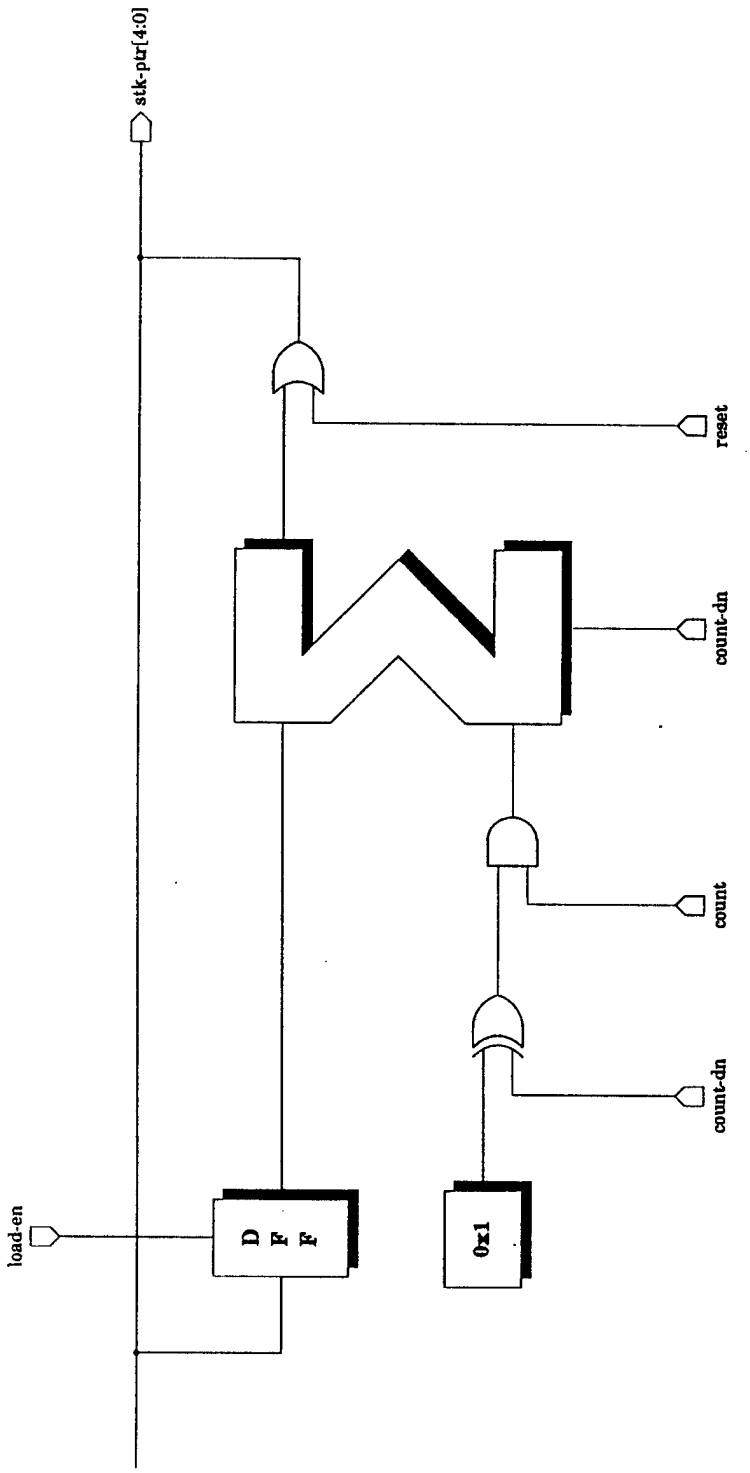


stk-ptr-mod

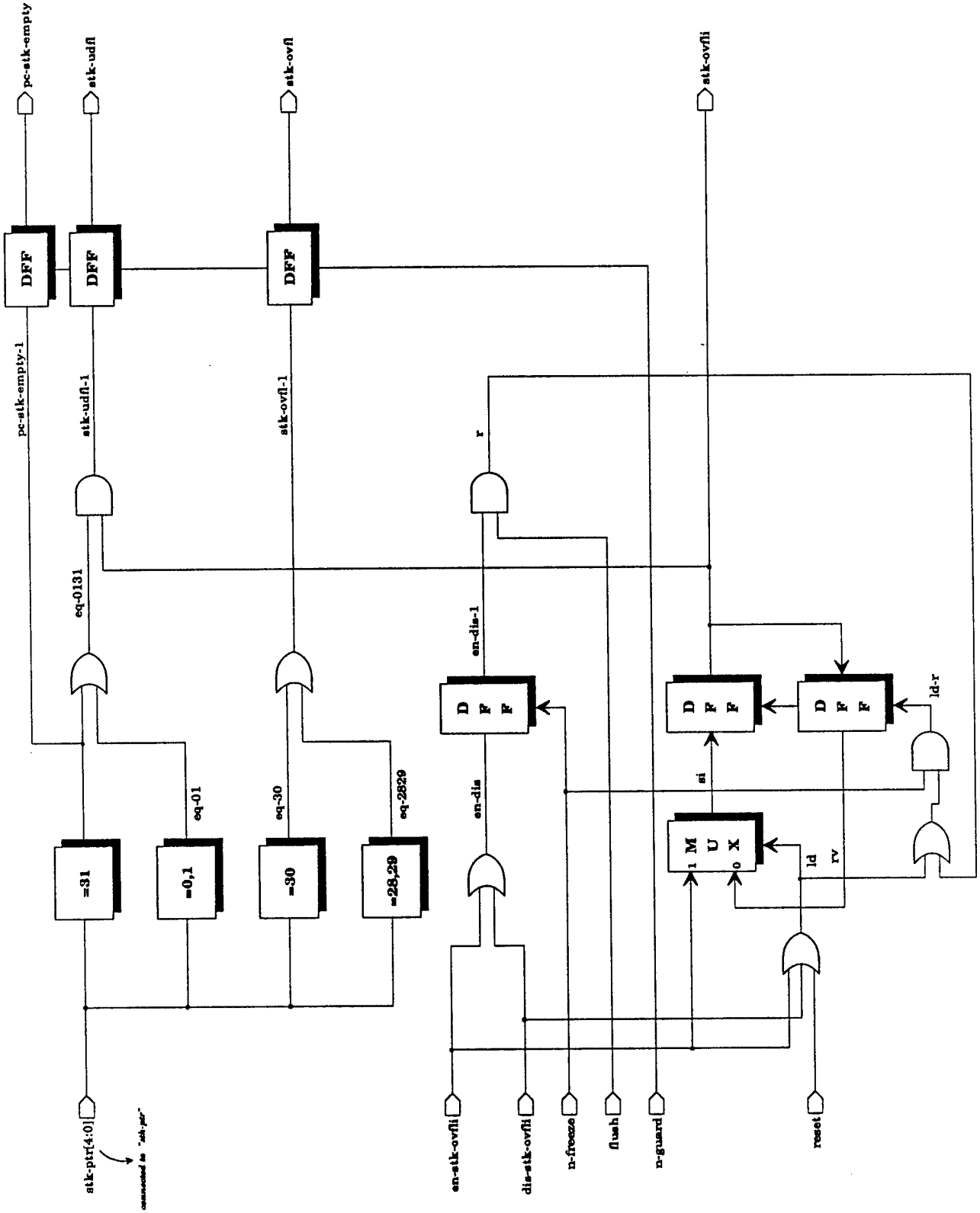
V:\GT-VIAG\STKPTRMD.DRW


count-up
count
count-dn
load-en
count-up-int
count-dn
cnt-up-fl
cnt-dn-fl
cnt-up
cnt-dn
cnt-up-1
cnt-dn-1
D F F
cu
cd
BL-BLX-guard
BP-BPX-guard
BL-BLX-stk
valid-intr-pulse
BP-BPX-stk
ps-pc-stk
ret-adr-sel
EP-ET
pop-pc-stk
EL-ELX
lcntr-zero
flush
n-freeze
count
n-guard
reset
stk-ptr-ctrl
V:\GT-VIAG\STKPTRCT.DBW

V:\GT-VIAG\STKPTRDP.DRW



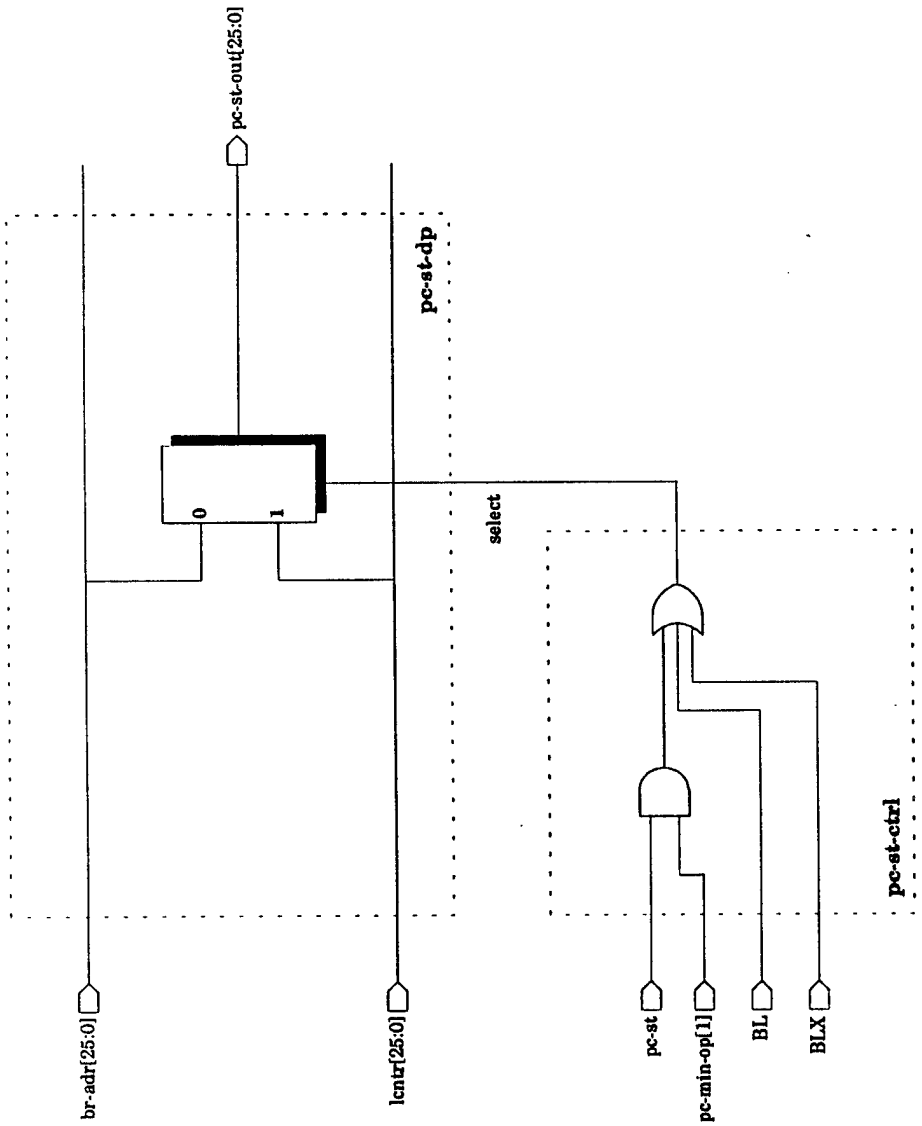
stk-ptr-dp



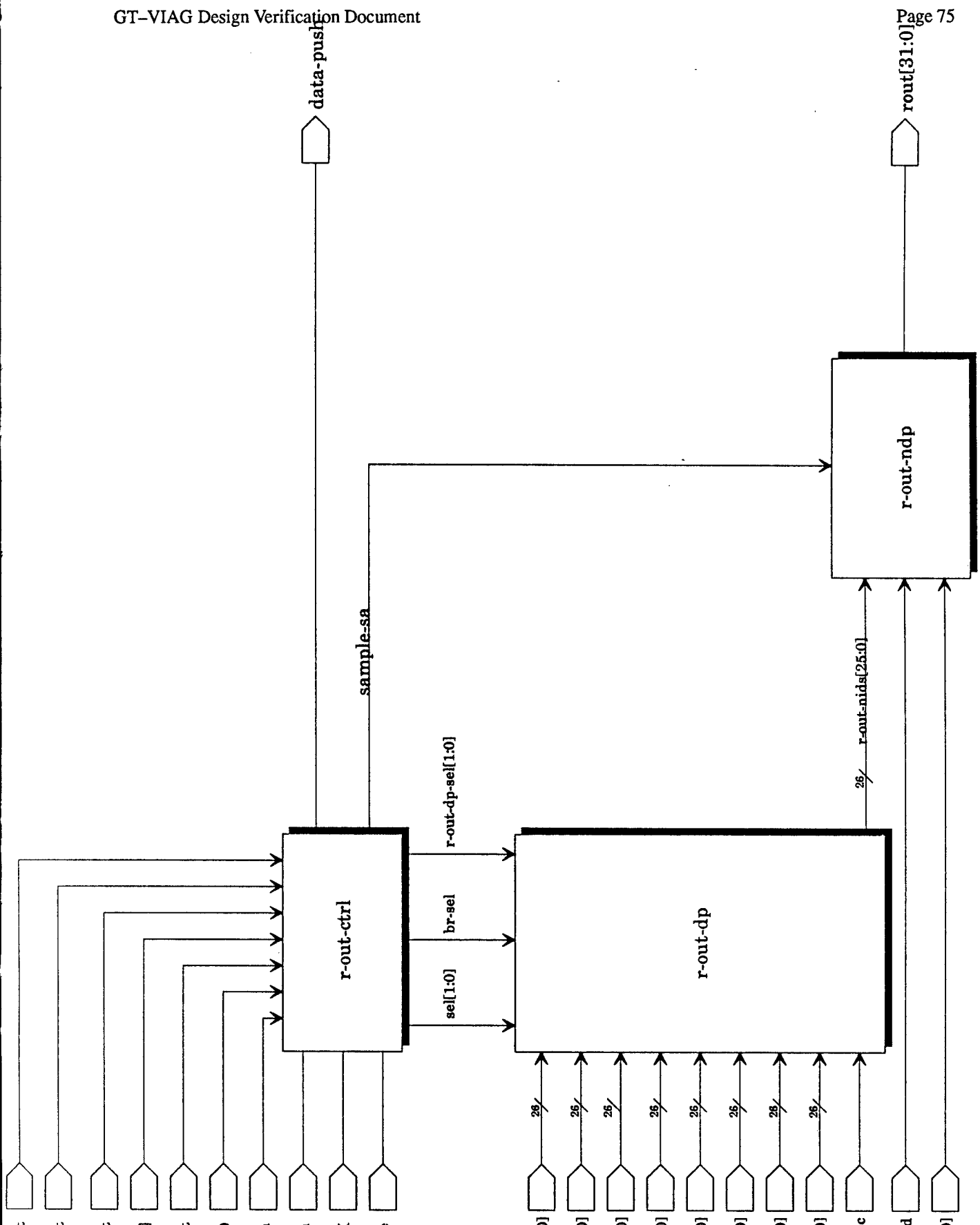
pc-gen-mod
stk-ptr-mod
stk-ptr-ovfli

V:\GT-VIAG\STKPTROV.DRW

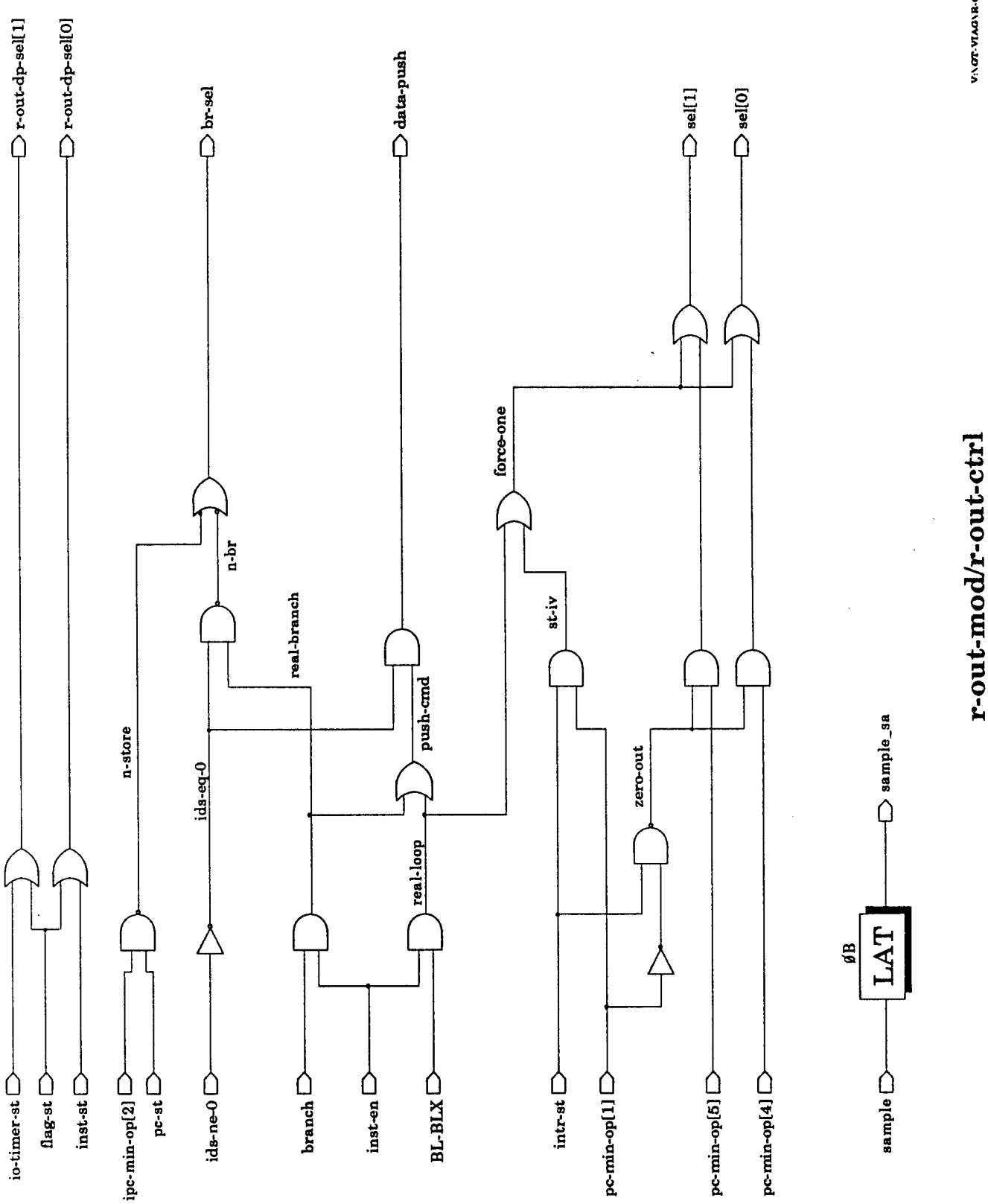
V:\GT-VIAG\PCSTMOD.DRW



pc-st-mod

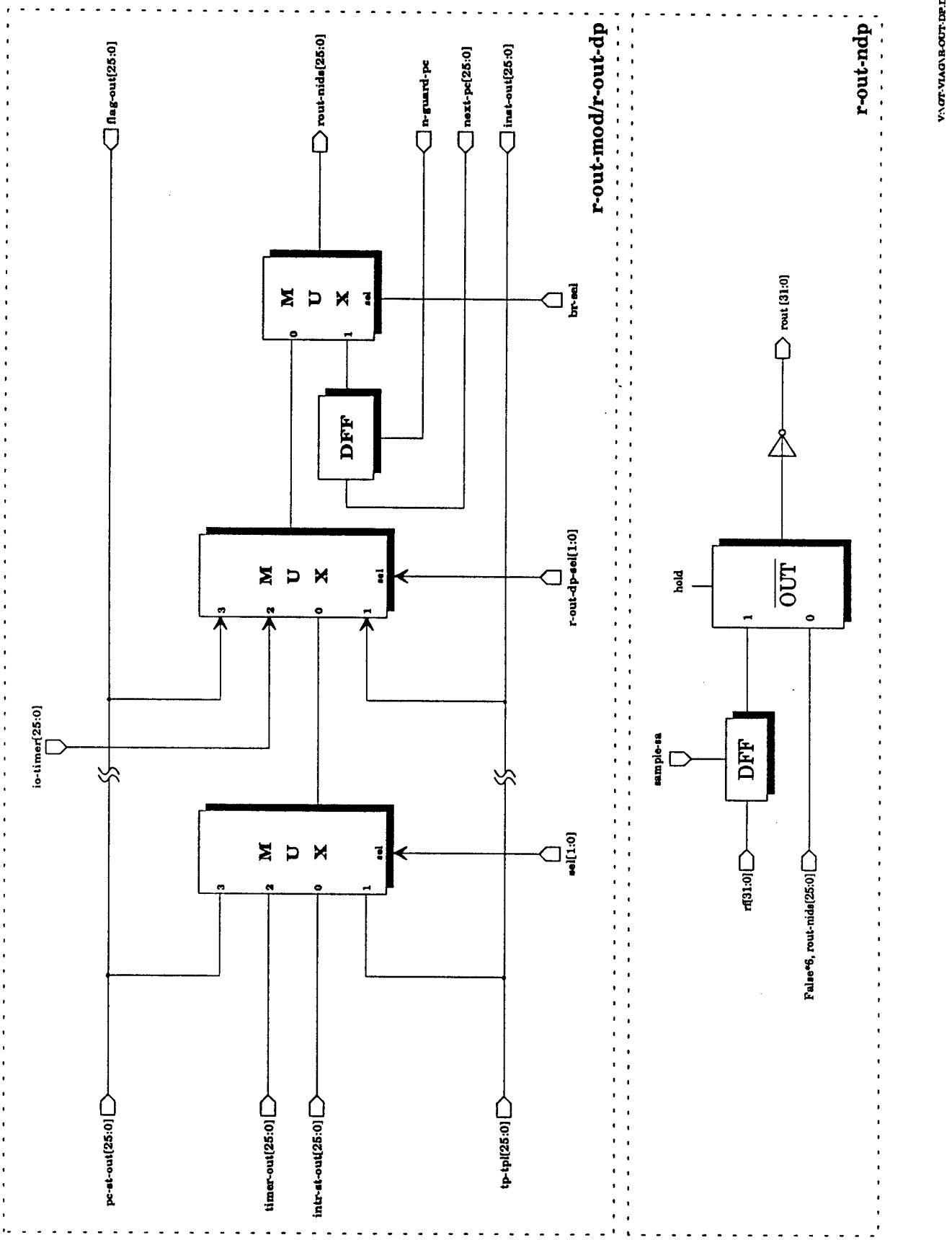

data-push
rout[31:0]
sample-sa
r-out-ndp
r-out-dp-sel[1:0]
r-out-nids[25:0]
26
r-out-ctrl
br-sel
sel[1:0]
r-out-dp
io-timer-st
flag-st
intr-st
pc-min-op[5,4,2,1]
pc-st
ids-ne-0
branch
inst-en
BL-BLX
sample
flag-out[25:0]
io-timer[25:0]
pc-st-out[25:0]
timer-out[25:0]
intr-st-out[25:0]
tp-tpl[25:0]
inst-out[25:0]
next-pc[25:0]
n-guard-pc
hold
rf[31:0]

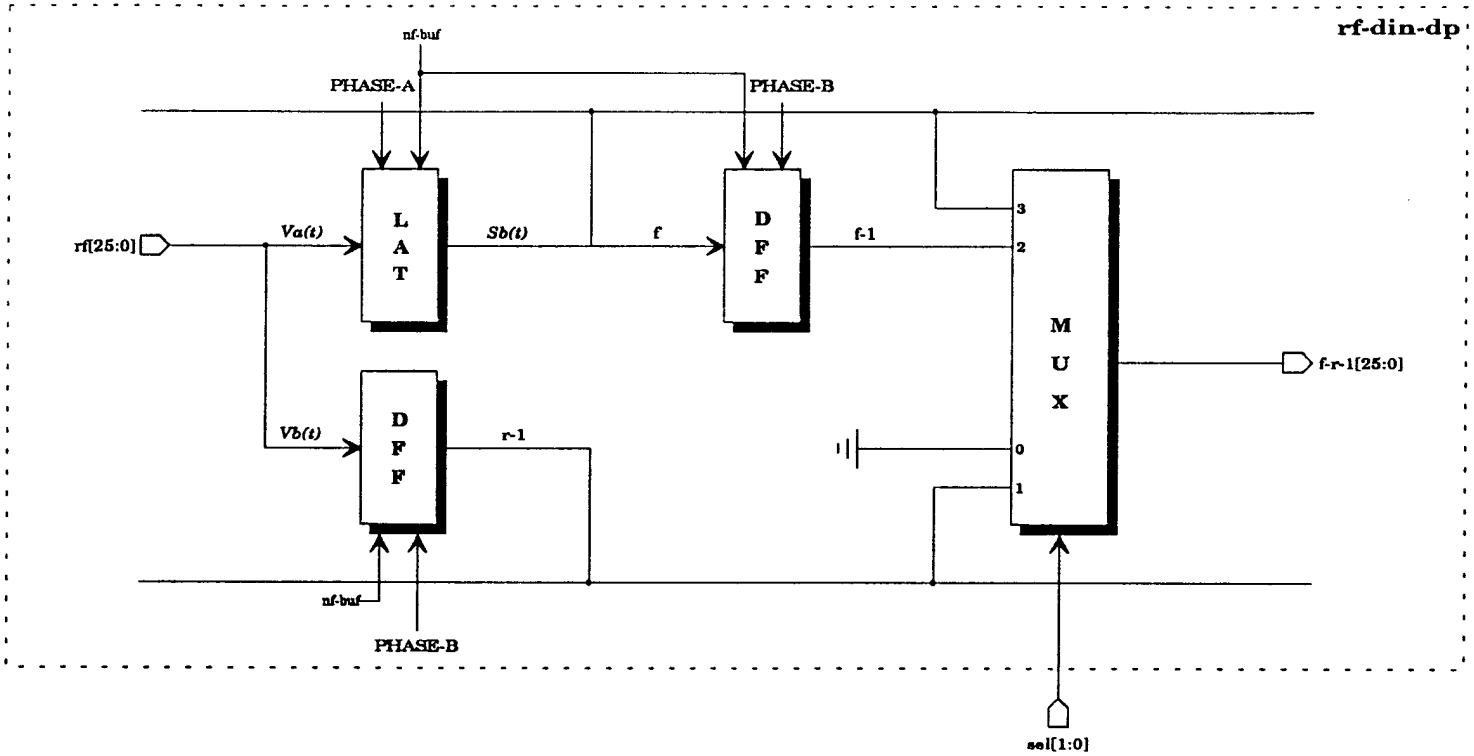
r-out-mod



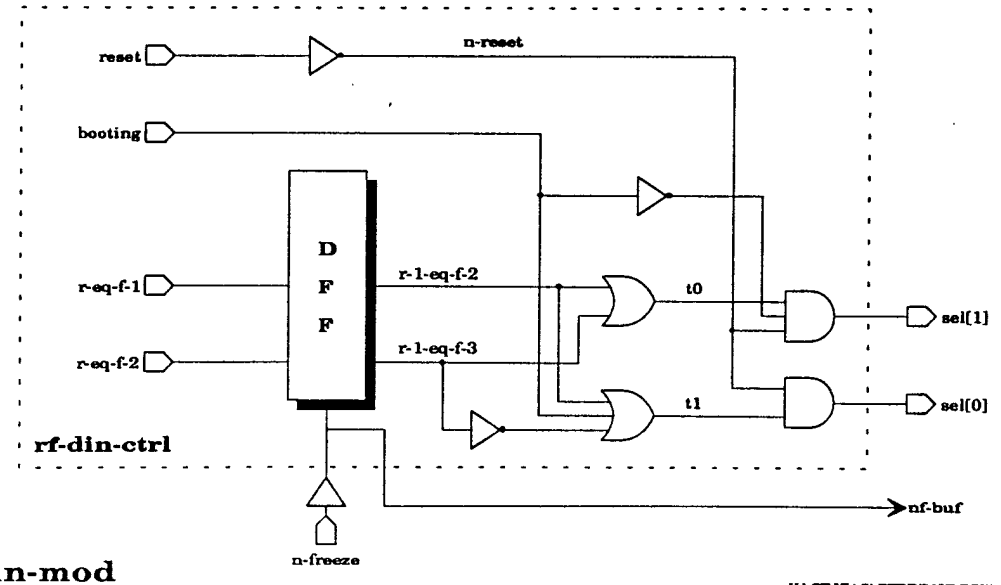
r-out-mod/r-out-ctrl

V:\GT-VIAG\R-OUT-CT.DRW


r-out-mod/r-out-dp
r-out-ndp
flag-out[25:0]
rout-nids[25:0]
n-guard-pc
next-pc[25:0]
inst-out[25:0]
br-sel
r-out-dp-sel[1:0]
sel[1:0]
io-timer[25:0]
pc-st-out[25:0]
timer-out[25:0]
intr-st-out[25:0]
tp-tpl[25:0]
MUX
DFF
rout [31:0]
hold
OUT
sample-ss
rff[31:0]
False*6, rout-nids[25:0]
V:\GT-VIAG\R-OUT-DP.DRW

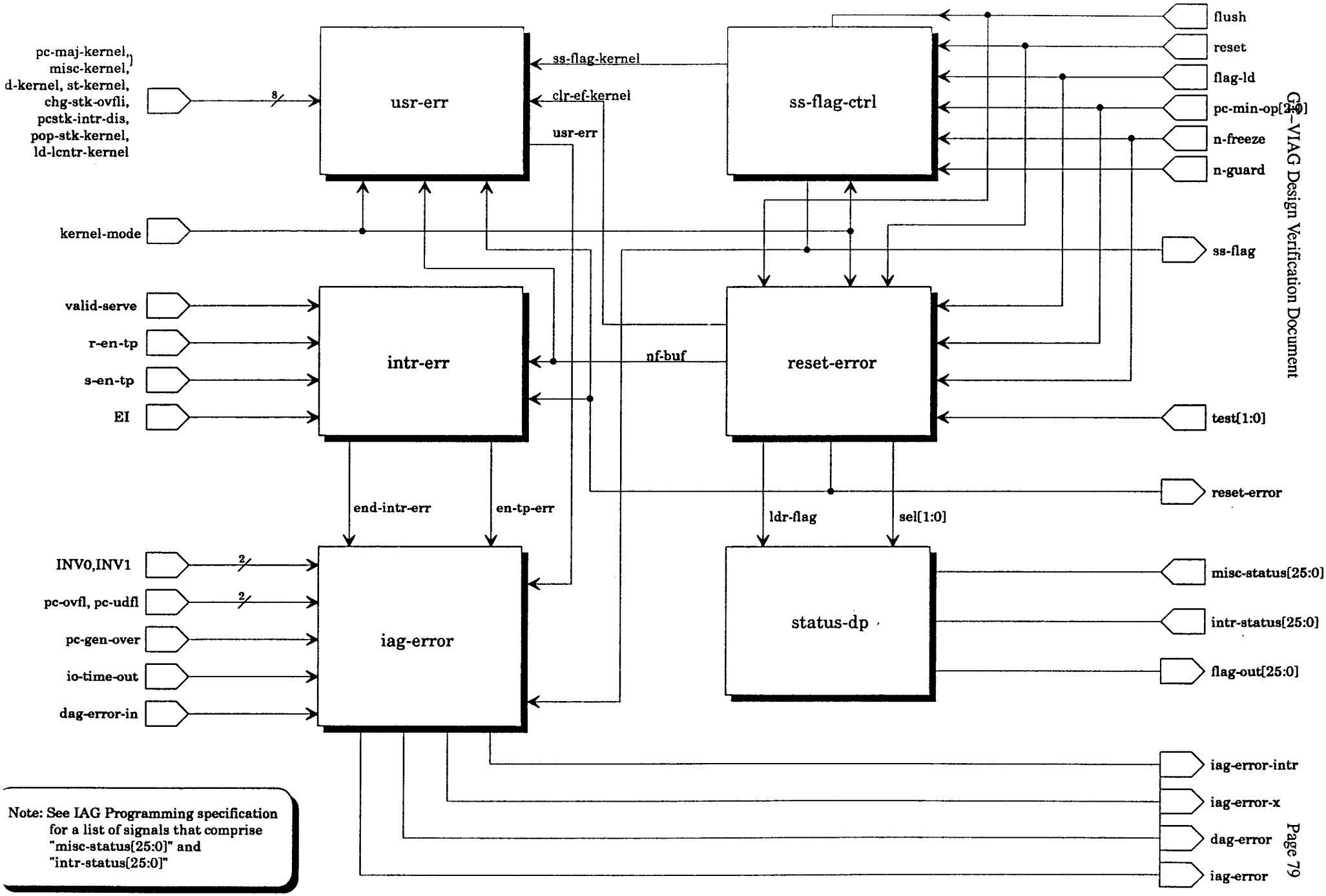


reset	Z^{-1}r-eq-f-1	Z^{-1}r-eq-f-2	f-r-1	sel[1:0]
0	0	0	r-1	0 1
0	0	1	f-1	1 0
0	1	0	f	1 1
0	1	1	f	1 1
1	X	X	0	0 0

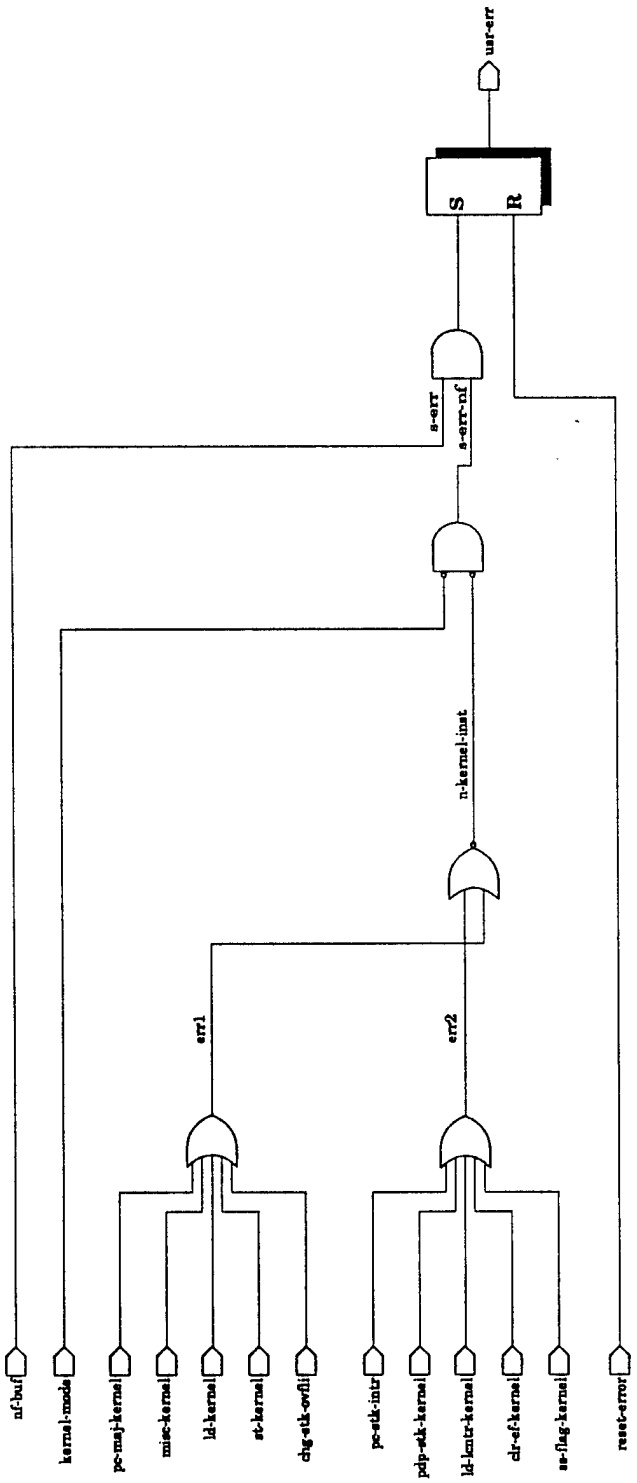


rf-din-mod

V:\GT-VIAG\RFDINMOD.DRW


pc-maj-kernel,
misc-kernel,
d-kernel, st-kernel,
chg-stk-ovfli,
pcstk-intr-dis,
pop-stk-kernel,
ld-lcntr-kernel
8
usr-err
ss-flag-kernel
clr-ef-kernel
usr-err
ss-flag-ctrl
flush
reset
flag-ld
pc-min-op[2:0]
n-freeze
n-guard
kernel-mode
ss-flag
valid-serve
r-en-tp
s-en-tp
EI
intr-err
nf-buf
reset-error
test[1:0]
reset-error
end-intr-err
en-tp-err
ldr-flag
sel[1:0]
INV0,INV1
2
pc-ovfl, pc-udfl
2
pc-gen-over
io-time-out
dag-error-in
iag-error
status-dp
misc-status[25:0]
intr-status[25:0]
flag-out[25:0]
iag-error-intr
iag-error-x
dag-error
iag-error
Note: See IAG Programming specification for a list of signals that comprise "misc-status[25:0]" and "intr-status[25:0]"

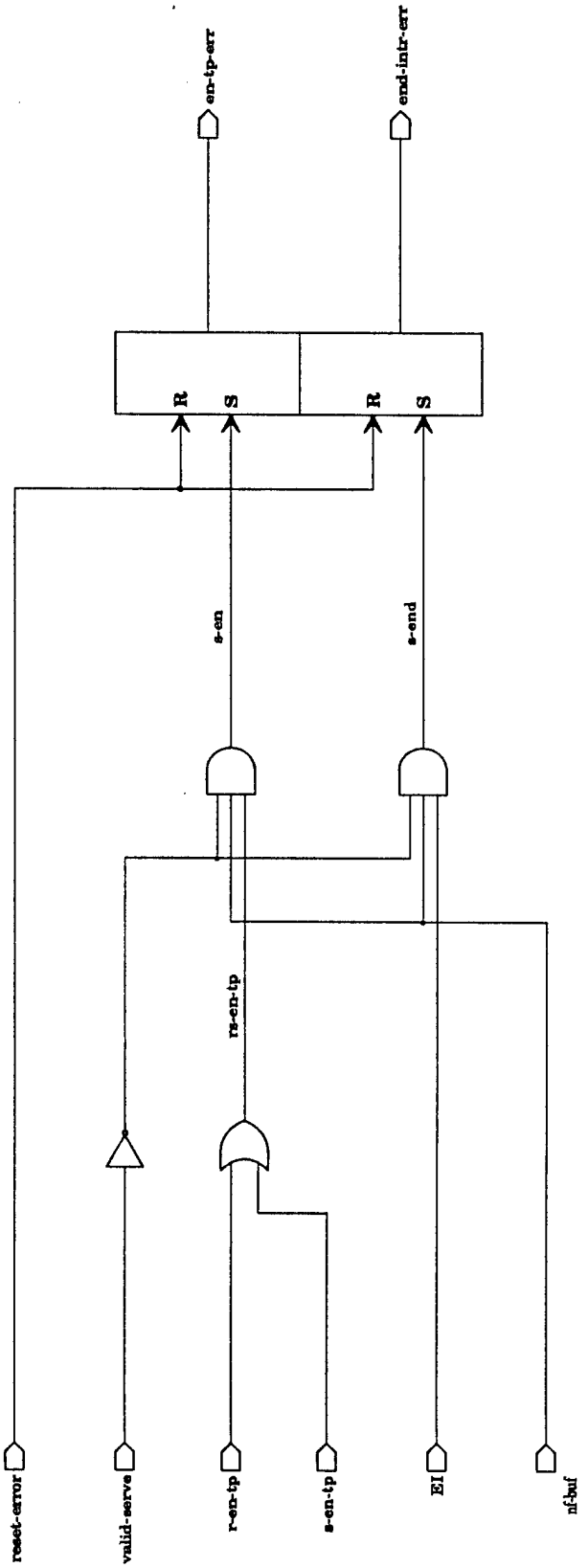
status-mod



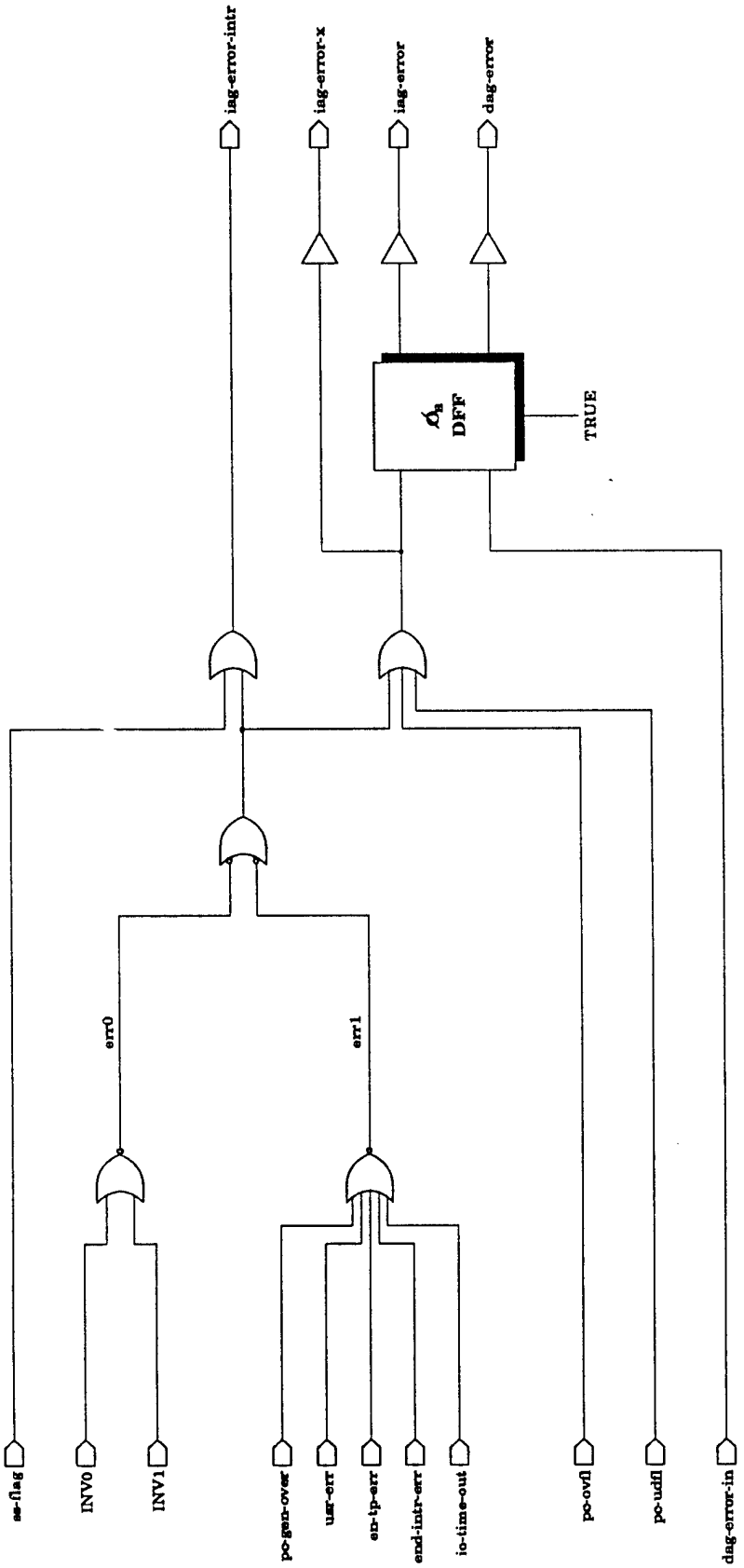
V:\GT-VIAG\USR-ERR.DRW

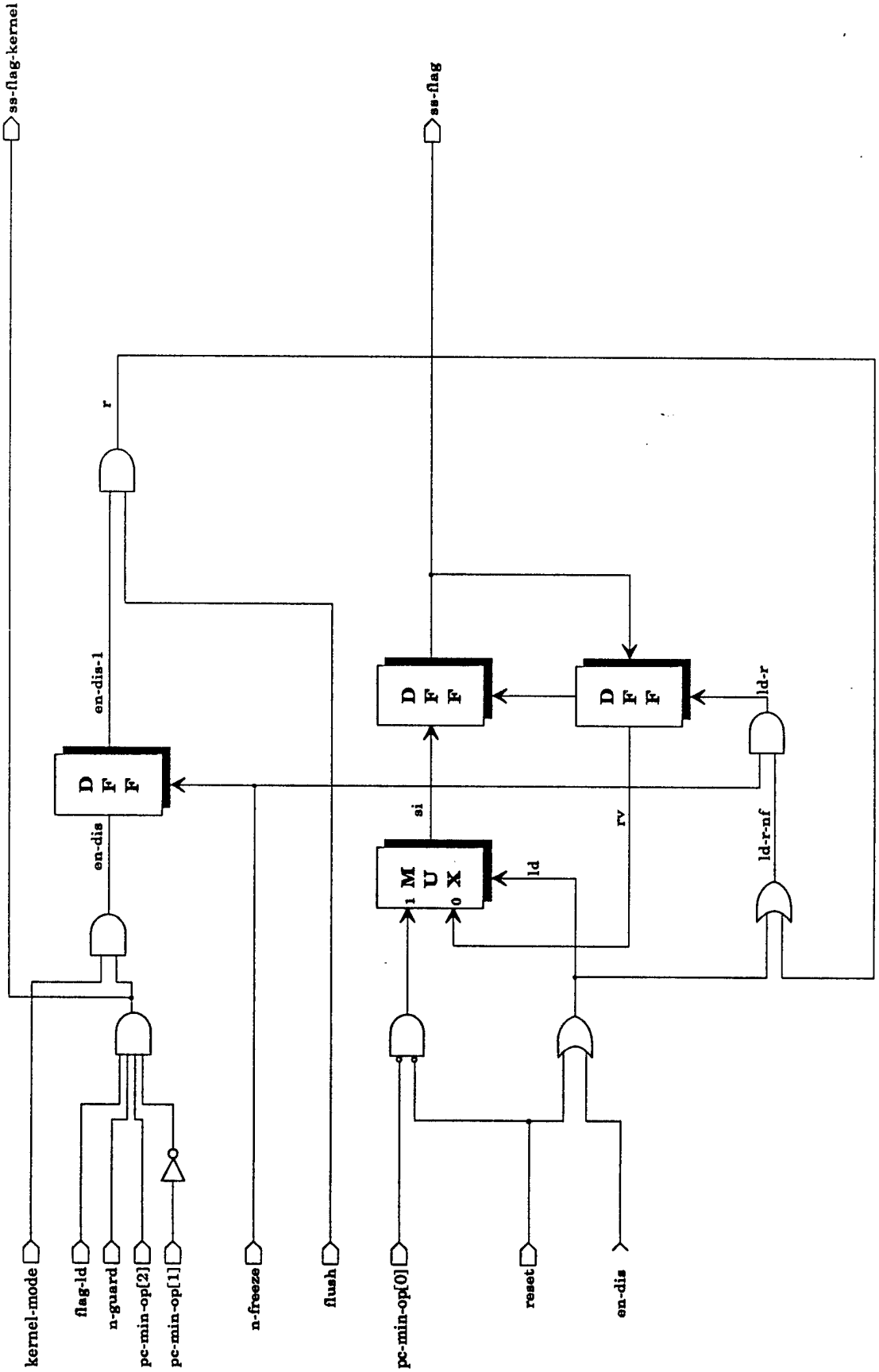
usr-err

V:\GT-VIAG\INTR-ERR.DRW

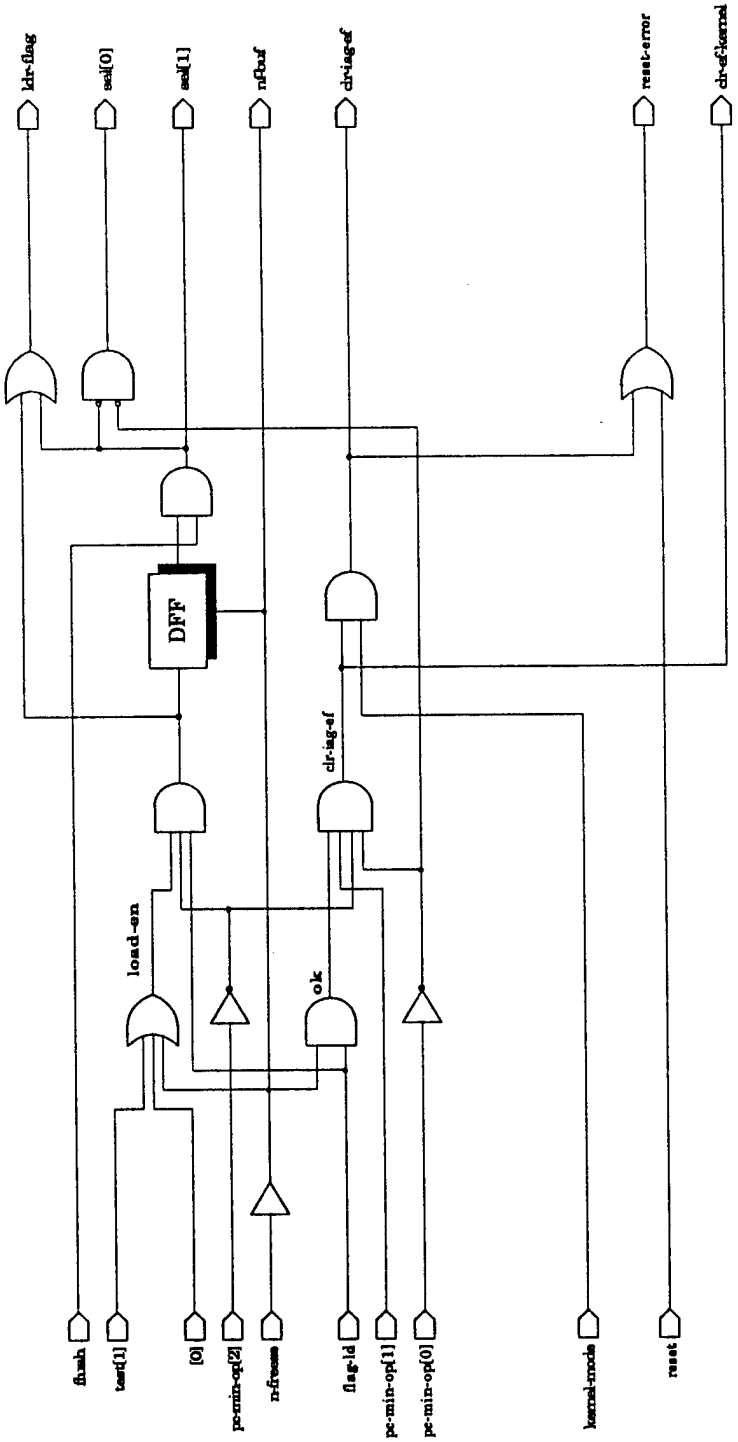


intr-err

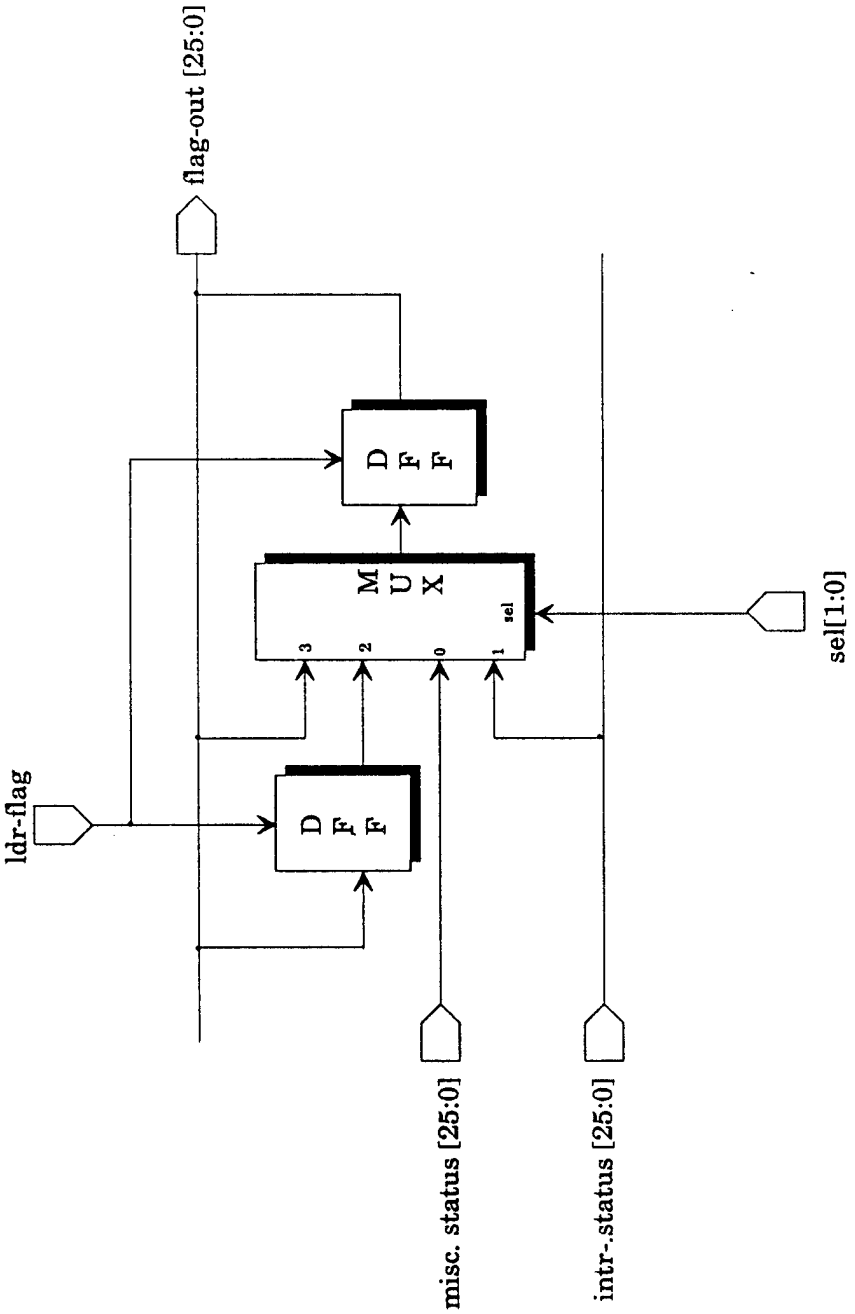

V:\GT-VIAG\IAG-ERR.DRW
iag-error-intr
iag-error-x
iag-error
dag-error
DFF
TRUE
err0
err1
ss-flag
INV0
INV1
po-gen-over
usr-err
en-ip-err
end-intr-err
io-time-out
po-ovfl
po-udfl
dag-error-in
status-mod
iag-error


ss-flag-kernel
ss-flag
r
en-dis-1
en-dis
si
rv
ld
ld-r
ld-r-nf
D F F
M U X
1
0
kernel-mode
flag-ld
n-guard
pc-min-op[2]
pc-min-op[1]
n-freeze
flush
pc-min-op[0]
reset
en-dis
status-mod
ss-flag-ctrl
V:\GT-VIAG\INTR-EN.DRW

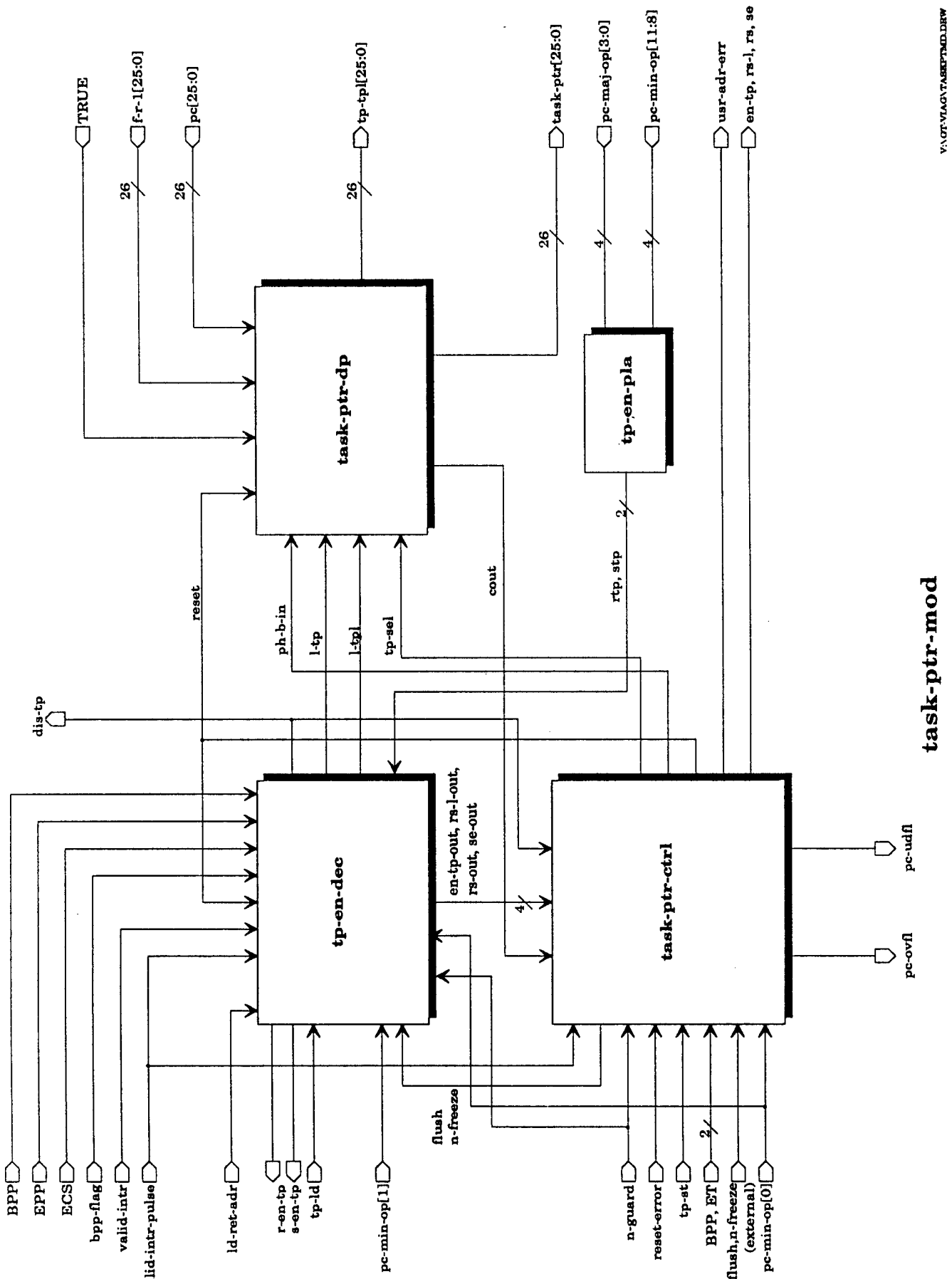
V:\GT-VIAG\RST-ERR.DRW

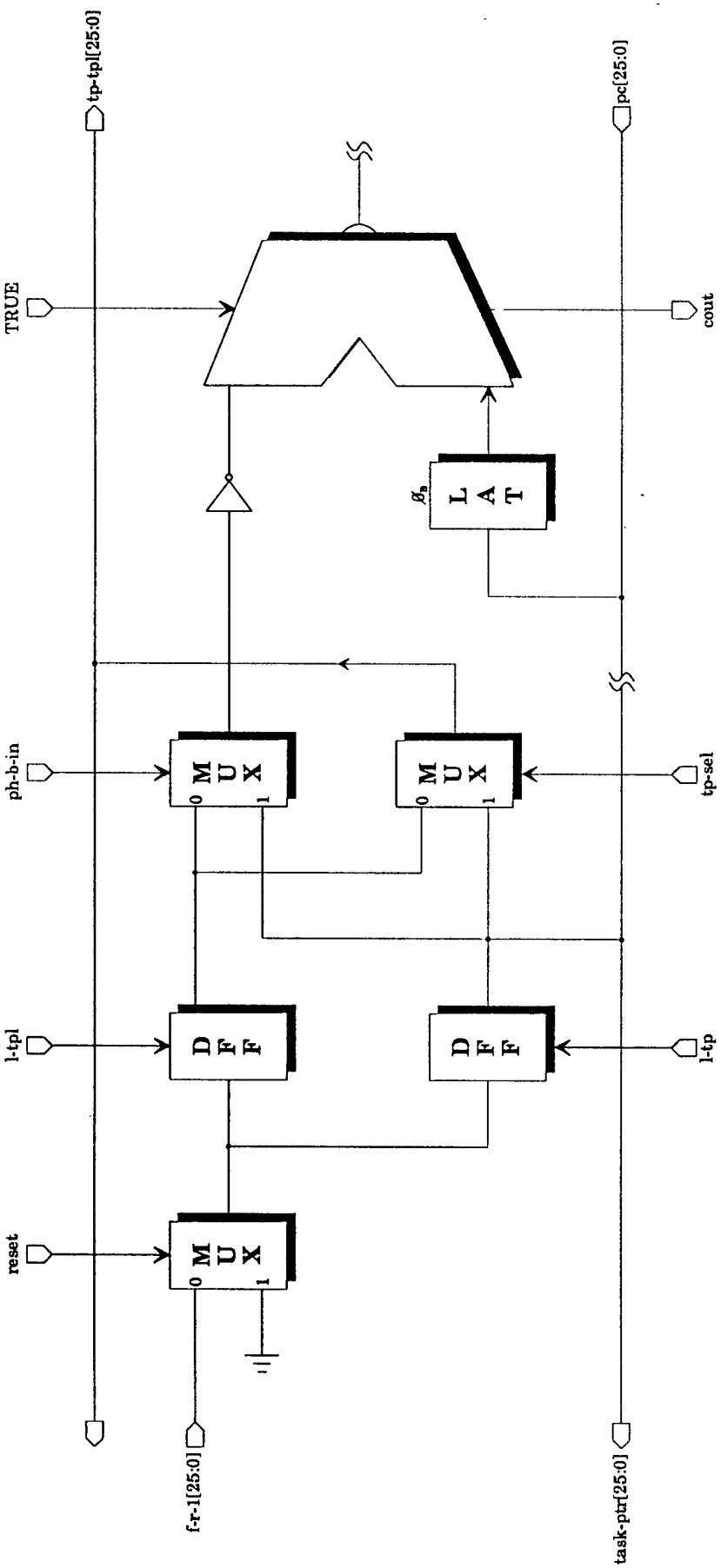


status-mod / reset-error


flag-out [25:0]
D F F
M U X
sel
3
2
0
1
sel[1:0]
ldr-flag
D F F
misc. status [25:0]
intr-.status [25:0]

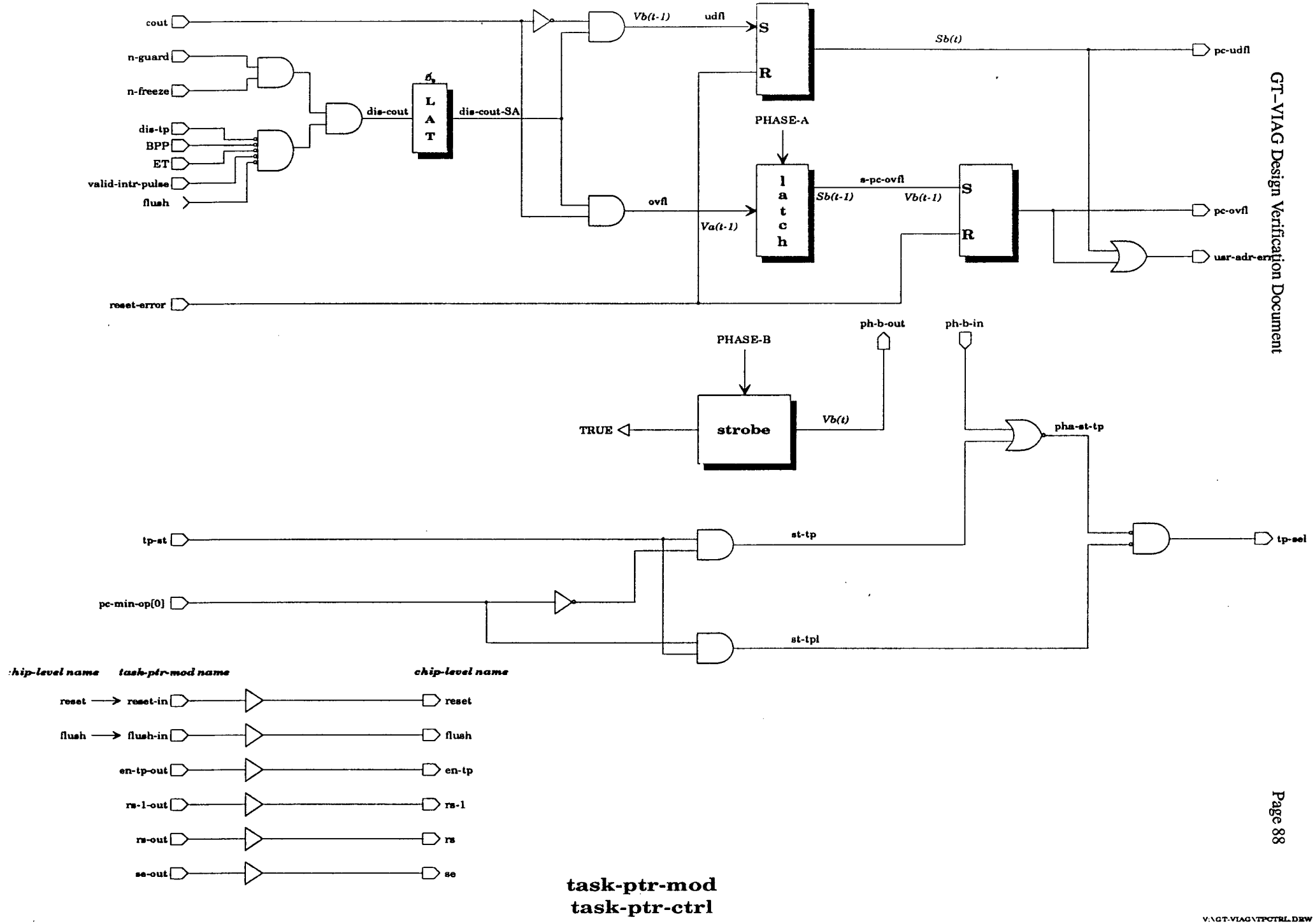
status-dp


task-ptr-mod
task-ptr-dp
tp-en-pla
tp-en-dec
task-ptr-ctrl
TRUE
f-r-1[25:0]
pc[25:0]
tp-tpl[25:0]
task-ptr[25:0]
pc-maj-op[3:0]
pc-min-op[11:8]
usr-adr-err
en-tp, rs-l, rs, se
reset
ph-b-in
l-tp
l-tpl
tp-sel
cout
rtp, stp
dis-tp
en-tp-out, rs-l-out, rs-out, se-out
flush
n-freeze
BPP
EPP
ECS
bpp-flag
valid-intr
valid-intr-pulse
ld-ret-adr
r-en-tp
s-en-tp
tp-ld
pc-min-op[1]
n-guard
reset-error
tp-st
BPP, ET
reset,flush,n-freeze (external)
pc-min-op[0]
pc-udfl
pc-ovfl
26
4
2



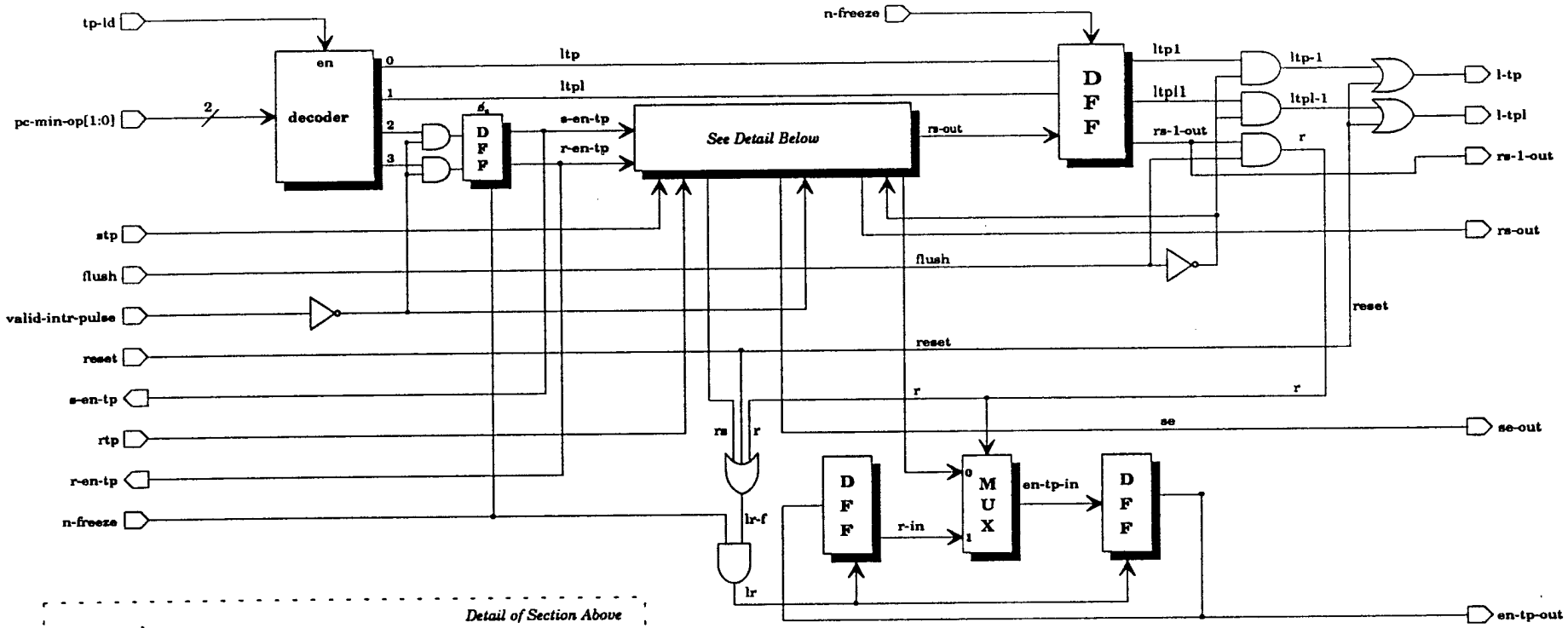
V:\GT-VIAG\TASKPTDP.DRW

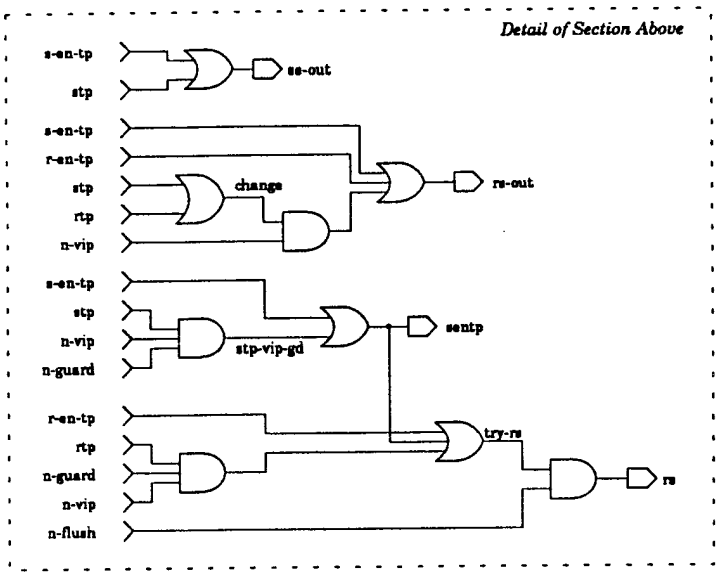
task-ptr-mod
task-ptr-dp

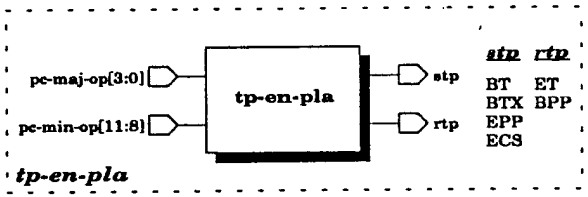


task-ptr-mod
task-ptr-ctrl

V:\GT-VIAG\TPCTRL.DRW

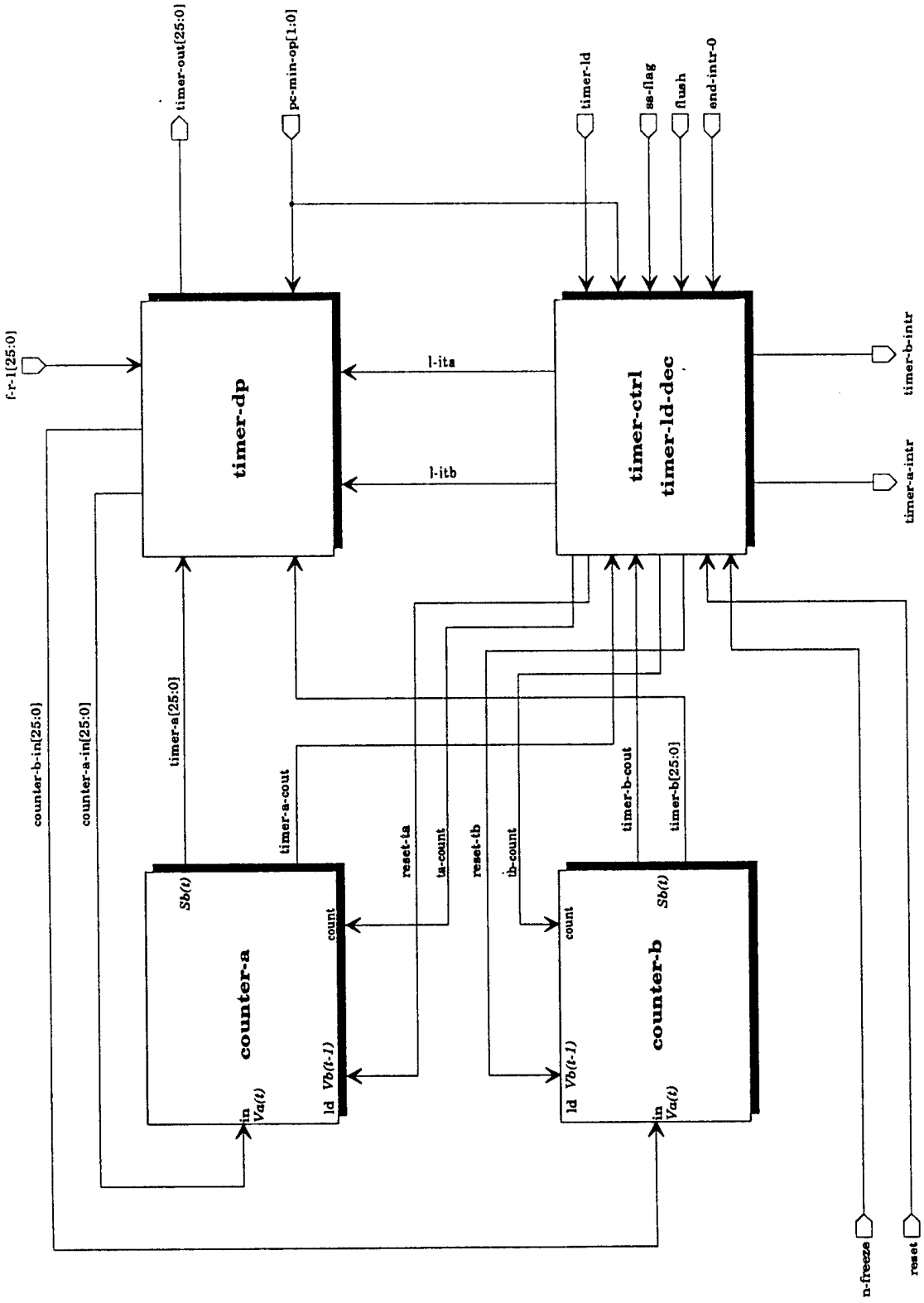






tp-en-dec

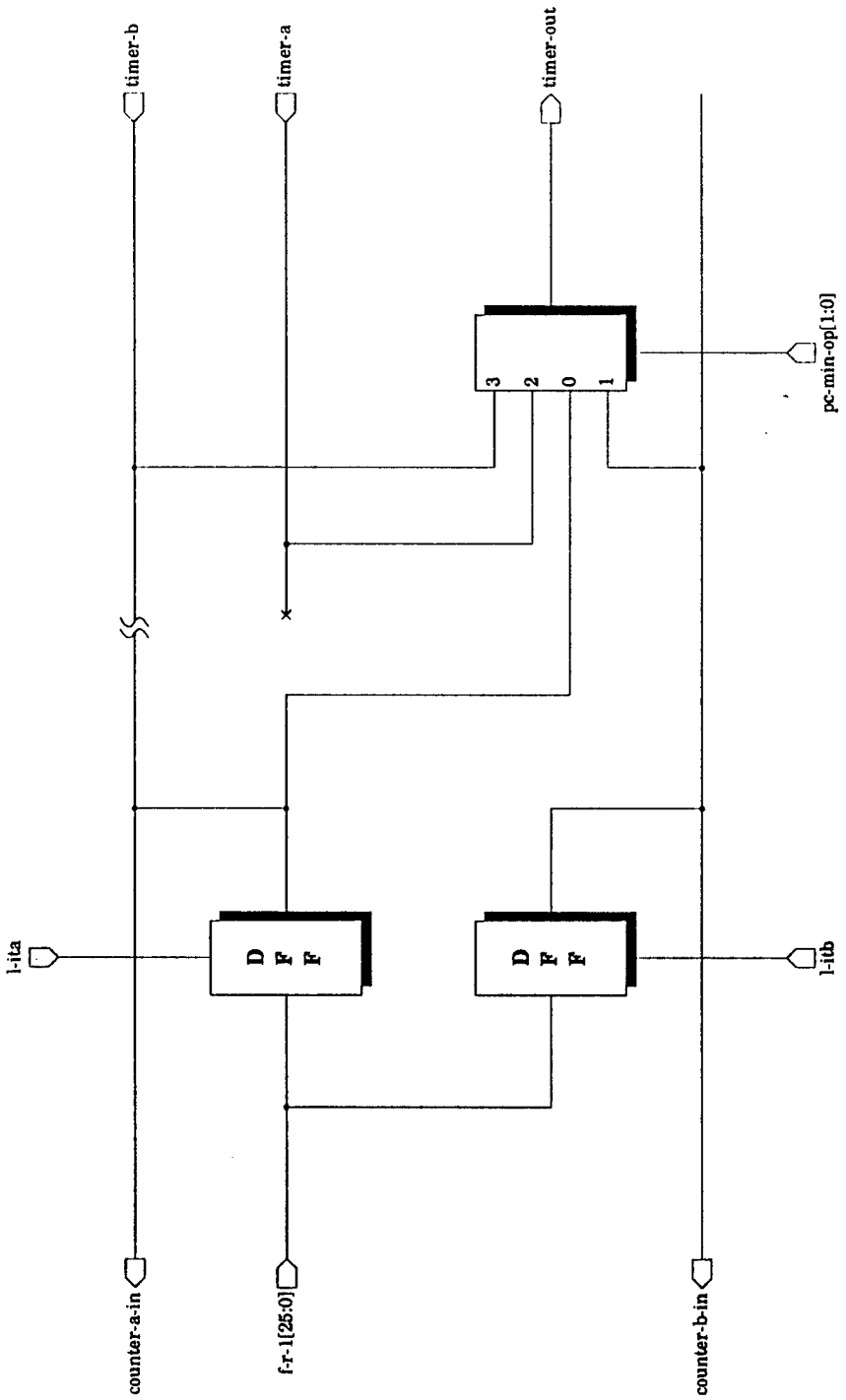
V:\GT-VIAG\TPENDEC.DRW



timer-mod

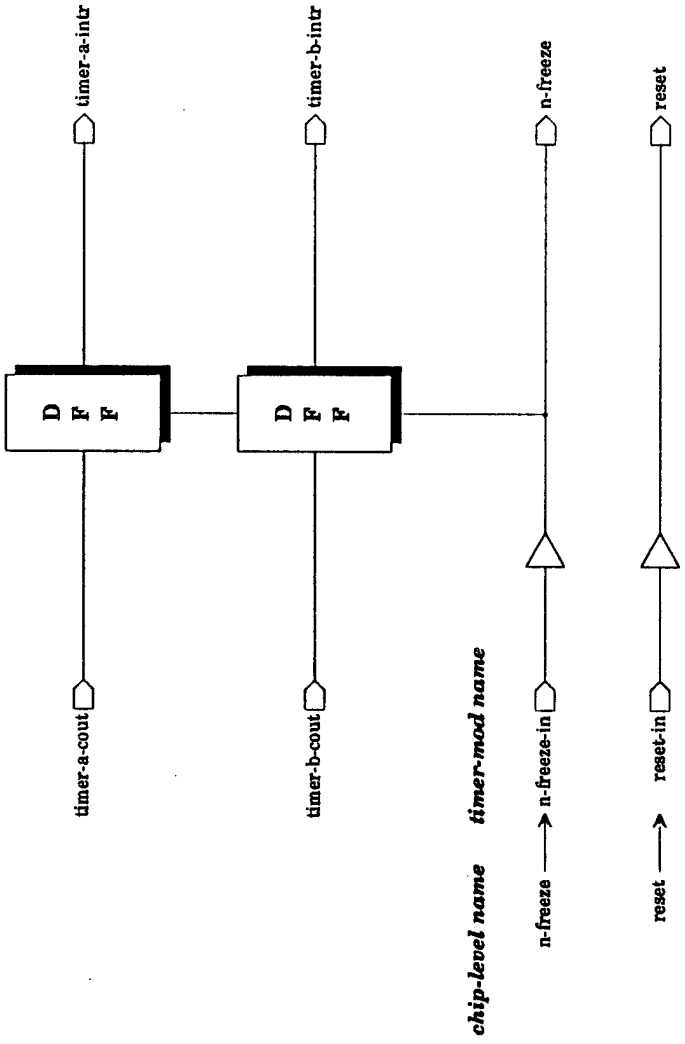
V:\GT-VIAG\TIMER-MD.DRW

V:\GT-VIAG\TIMER-DP.DRW

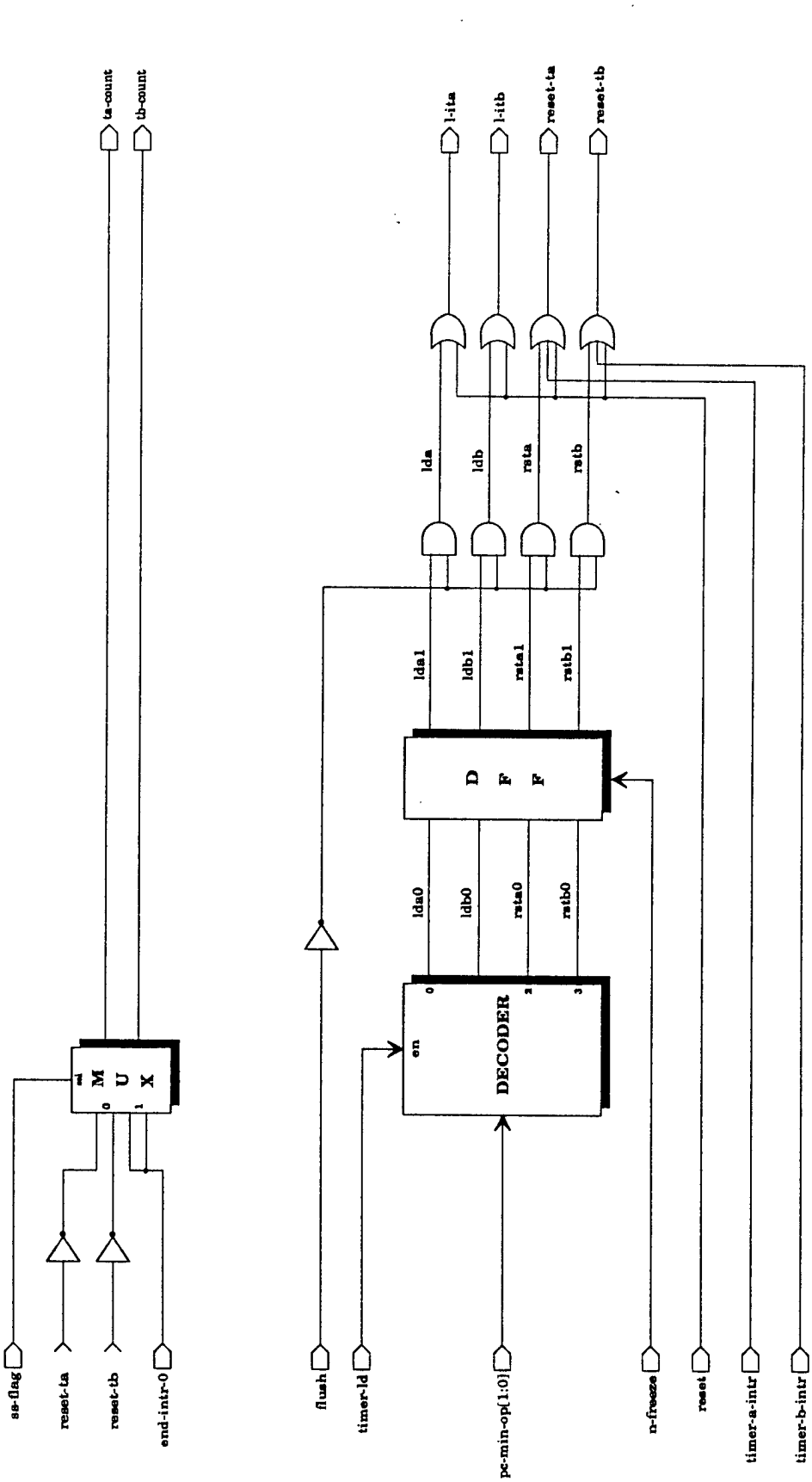


timer-dp

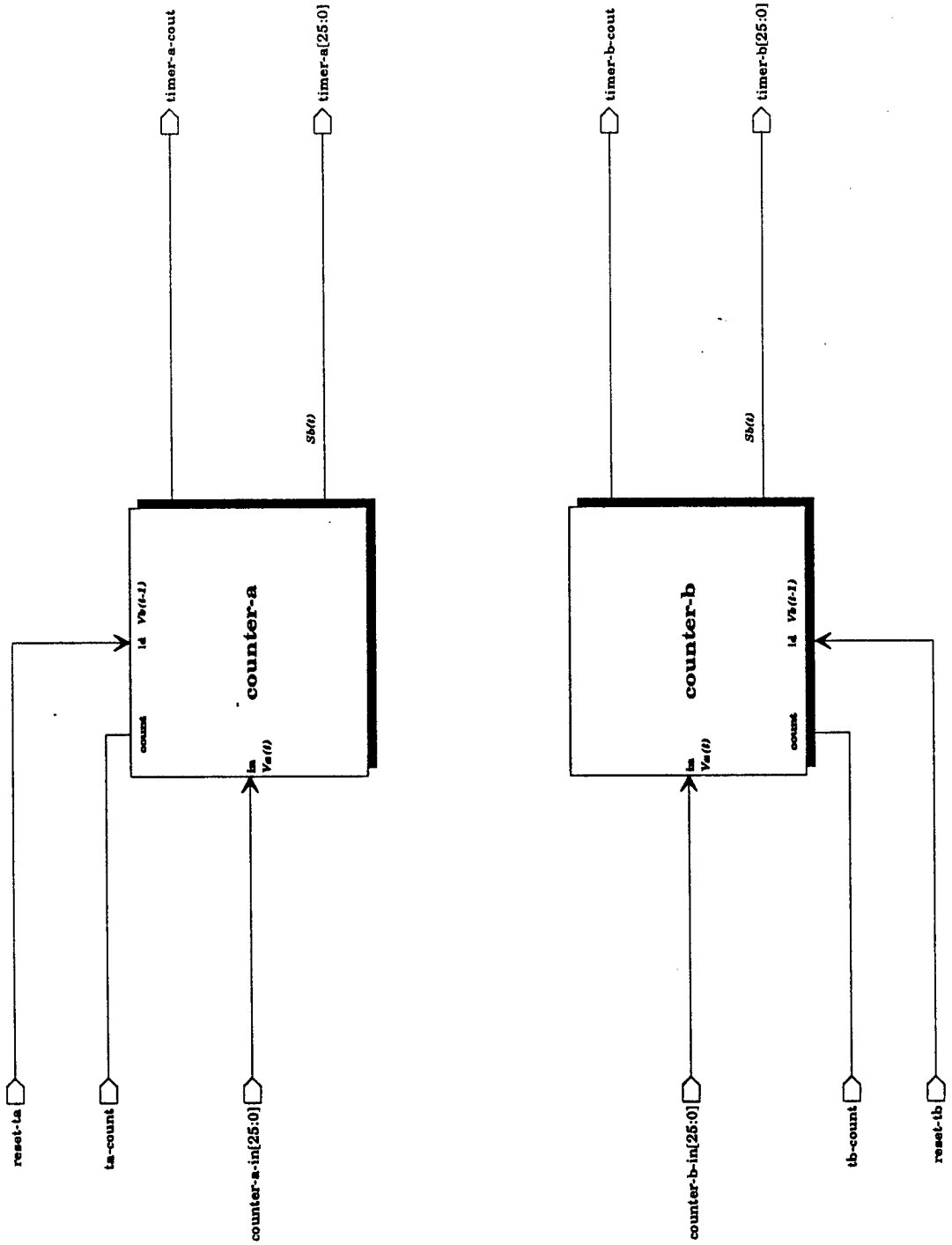
V:\GT-VIAG\TIMER-CT.DRW



timer-mod
timer-ctrl

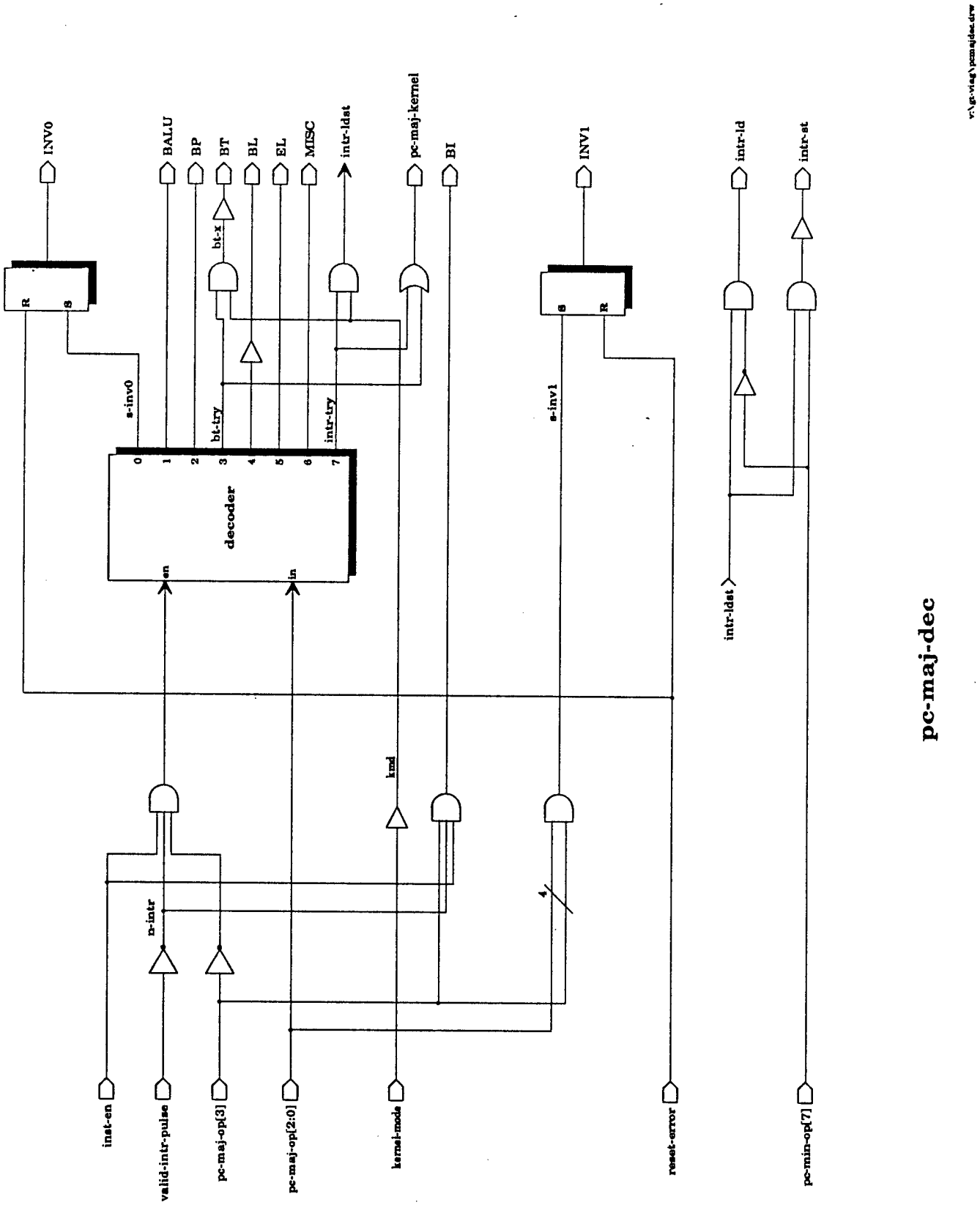

V:\GT-VIAG\TIMER-LD.DRW
ta-count
tb-count
l-ita
l-itb
reset-ta
reset-tb
lda
ldb
rata
ratb
lda1
ldb1
rata1
ratb1
lda0
ldb0
rata0
ratb0
D F F
DECODER
en
0
1
3
M U X
sa-flag
reset-ta
reset-tb
end-intr-0
flush
timer-ld
pc-min-op[1:0]
n-freeze
reset
timer-a-intr
timer-b-intr

timer-ld-dec

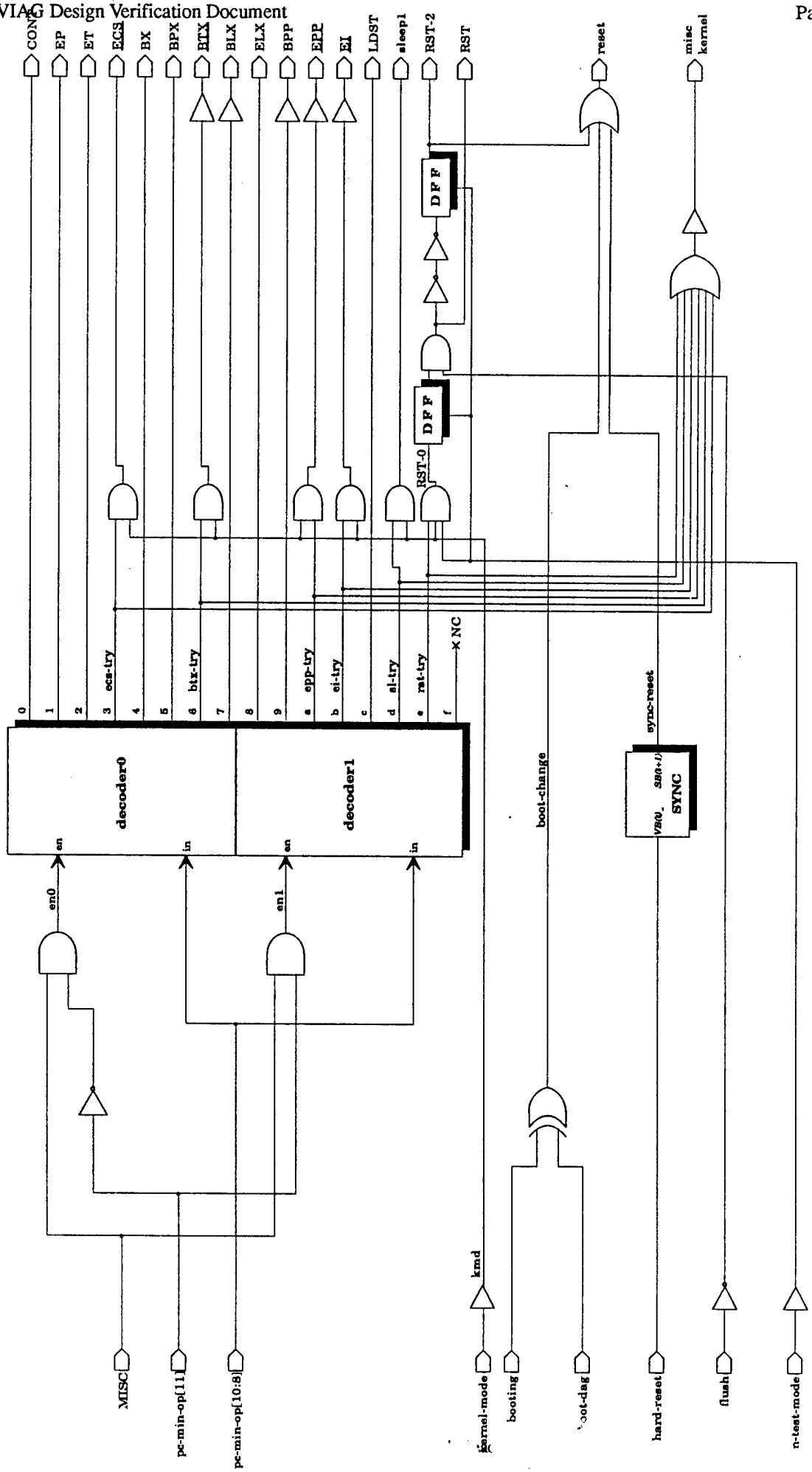


counter-a & counter-b

V:\GT-VIAG\CNTAGNTB.DRW

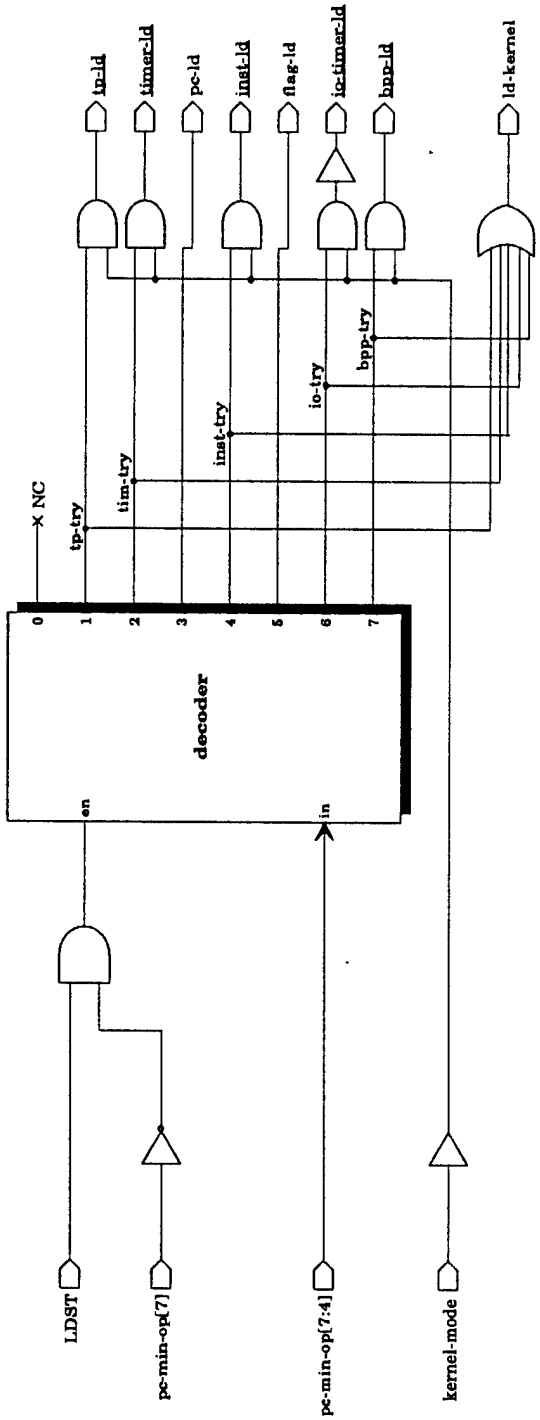

v:\gt-viag\pcmajdec.drw
INV0
BALU
BP
BT
BL
EL
MISC
intr-ldst
pc-maj-kernel
BI
INV1
intr-ld
intr-st
R
S
bt-x
s-inv0
bt-try
intr-try
0
1
2
3
4
5
6
7
decoder
en
in
s-inv1
S
R
intr-ldst
kmd
n-intr
4
inst-en
valid-intr-pulse
pc-maj-op[3]
pc-maj-op[2:0]
kernel-mode
reset-error
pc-min-op[7]

pc-maj-dec


CON
EP
ET
ECS
BX
BPX
BTX
BLX
ELX
BPP
EPP
EI
LDST
sleep1
RST-2
RST
reset
misc kernel
DFF
DFF
RST-0
0
1
2
3 ecs-try
4
5
6 btx-try
7
8
9
a epp-try
b ei-try
c
d sl-try
e rst-try
f
NC
decoder0
decoder1
en
in
en0
en1
boot-change
sync-reset
SYNC
kmd
MISC
pc-min-op[11]
pc-min-op[10:8]
kernel-mode
booting
hard-reset
flush
n-test-mode

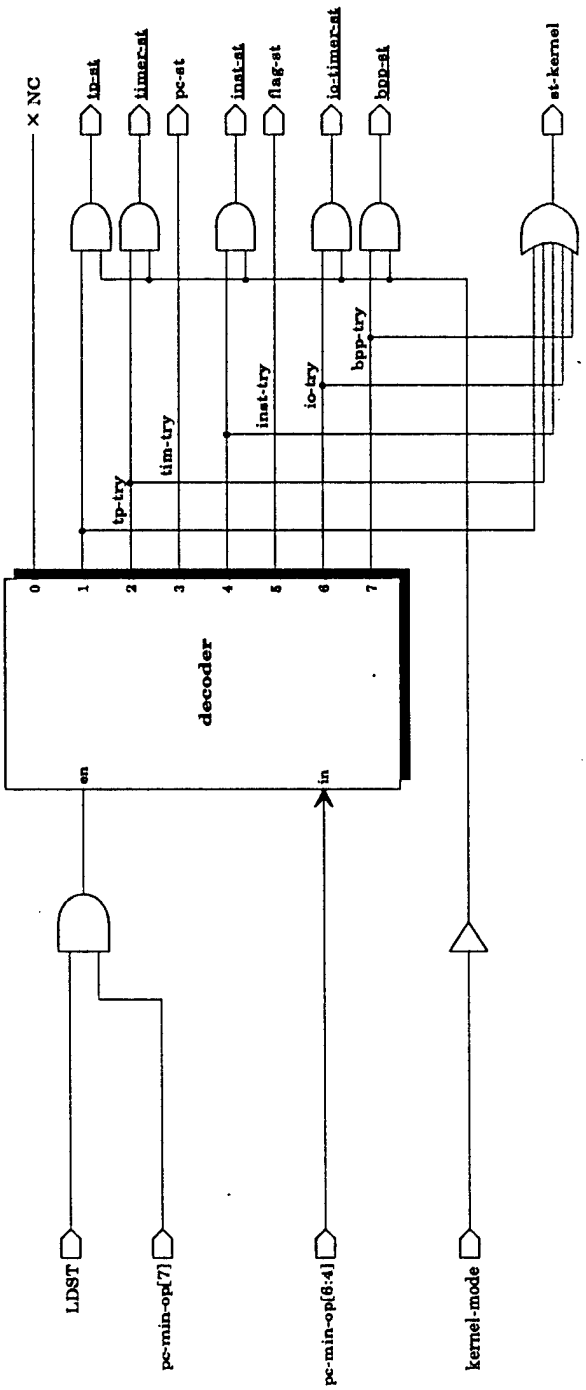
MISC-dec

v:\gt-viag\ld-dec.drw

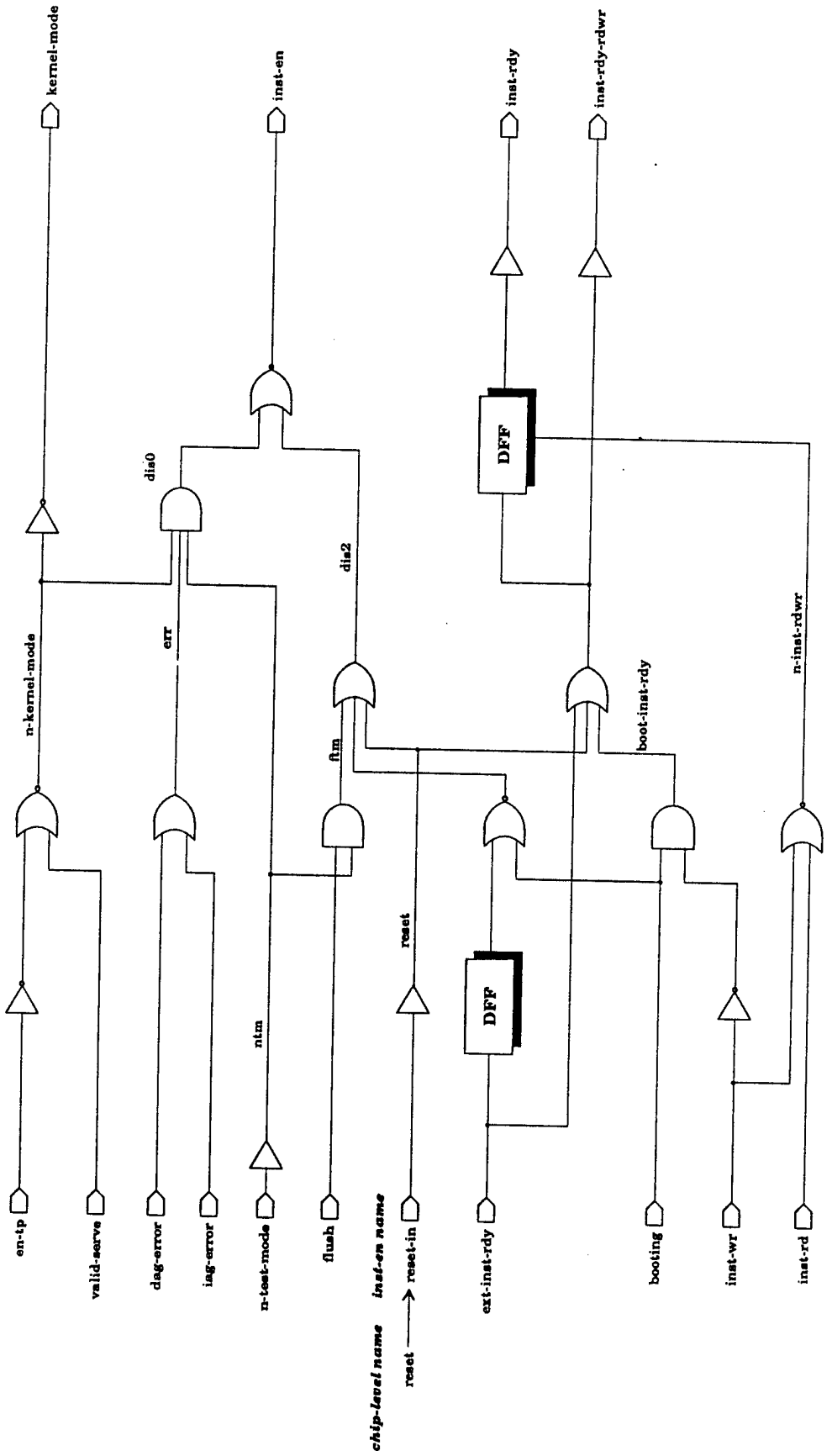


LD-dec

v:\gt-viag\st-dec.drw



ST-dec



inst-en

V:\GT-VIAG\INST-EN.DRW

6. Timing Diagrams

The following are timing diagrams of the various types of I/O that the GT–EP chipset supports. A more complete description of the interface can be found in the GT–EP I/O Interface Specification.

a

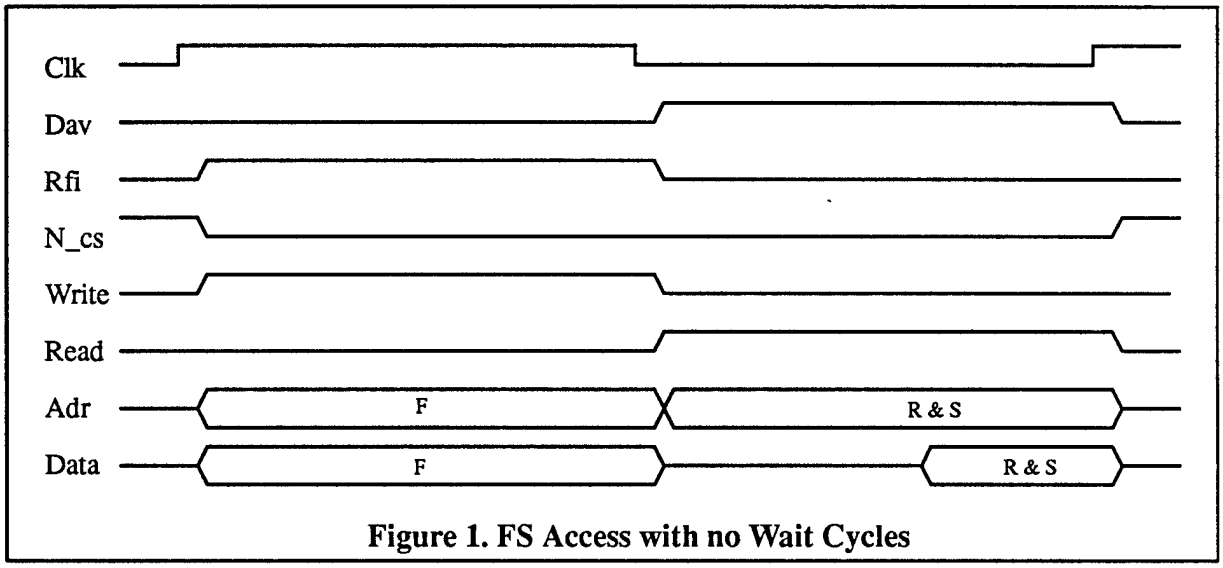


Figure 1. FS Access with no Wait Cycles

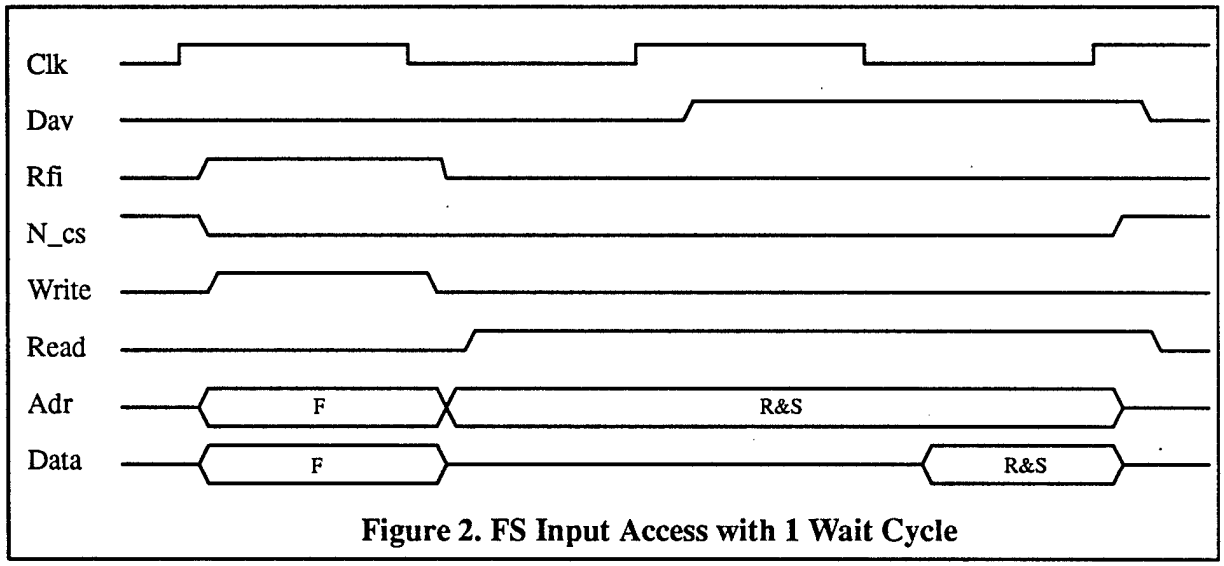


Figure 2. FS Input Access with 1 Wait Cycle

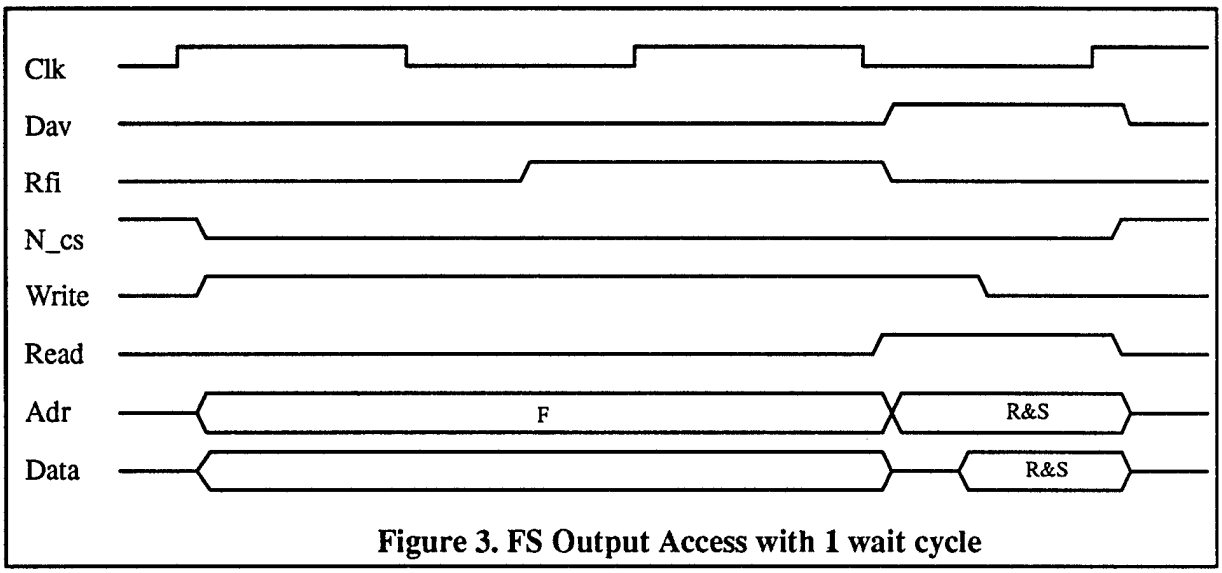


Figure 3. FS Output Access with 1 wait cycle

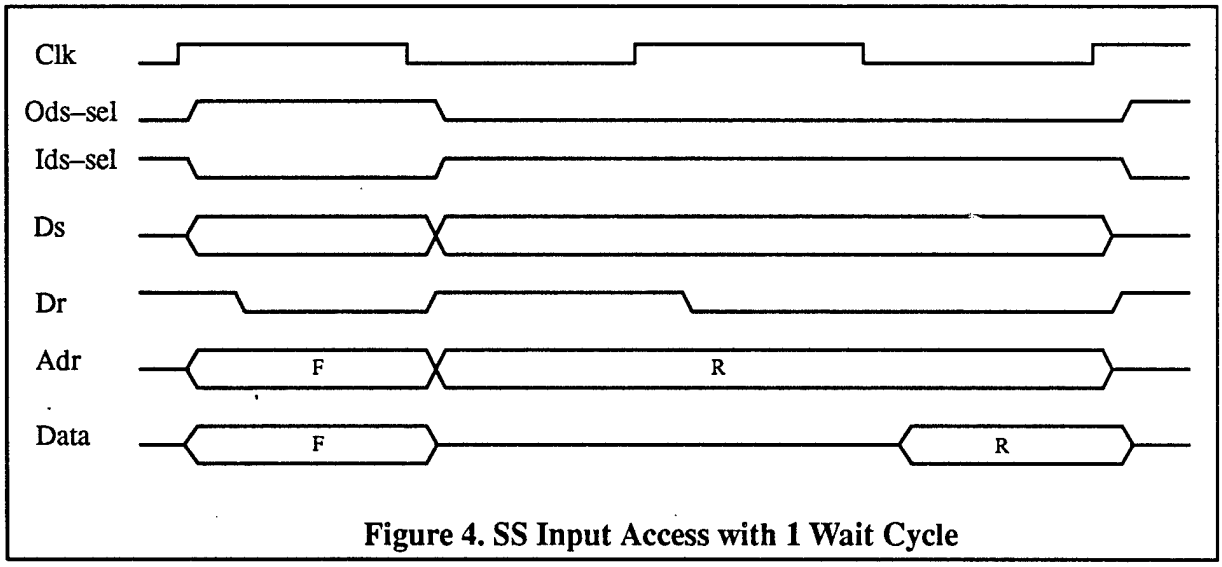


Figure 4. SS Input Access with 1 Wait Cycle

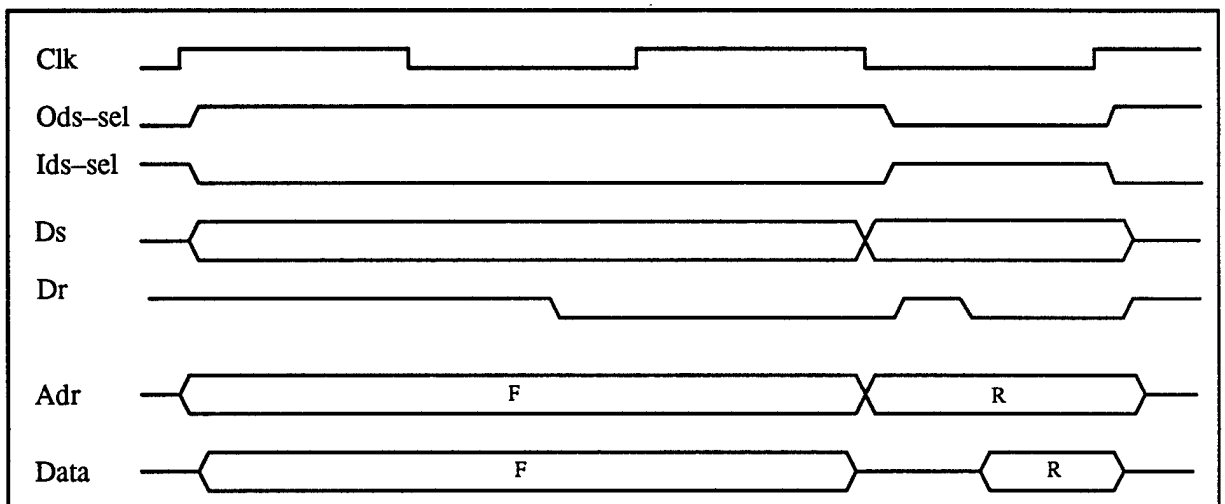


Figure 5. SS Output Access with 1 Wait Cycle

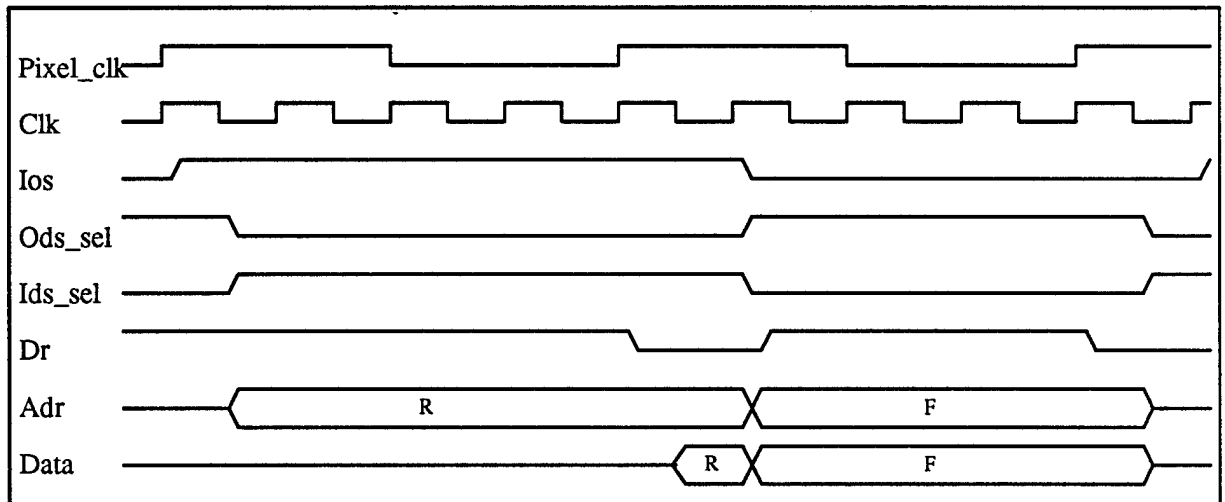


Figure 6. Typical I/O Access with Ios Signal

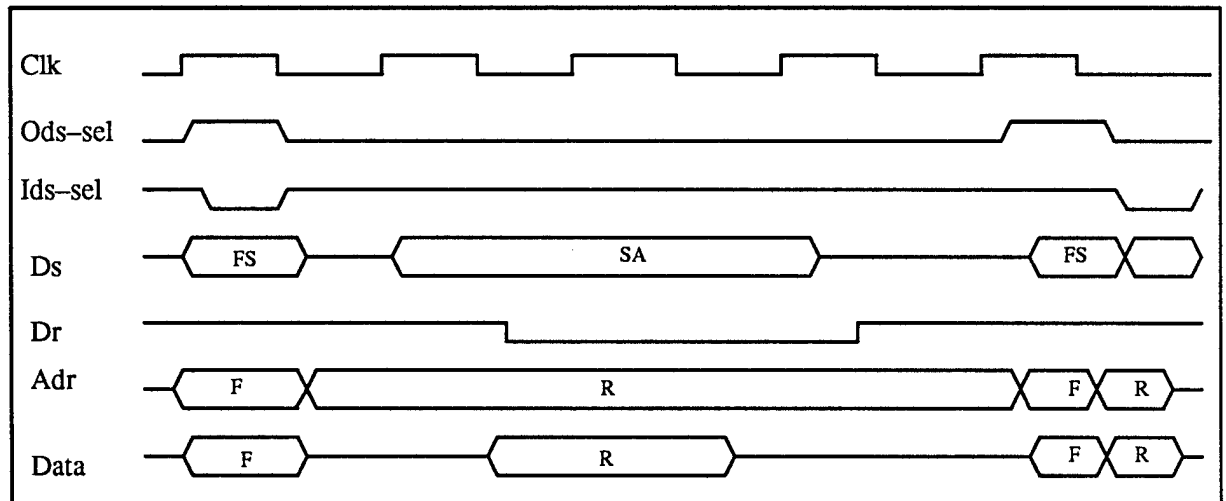


Figure 7. Typical SA Input Access

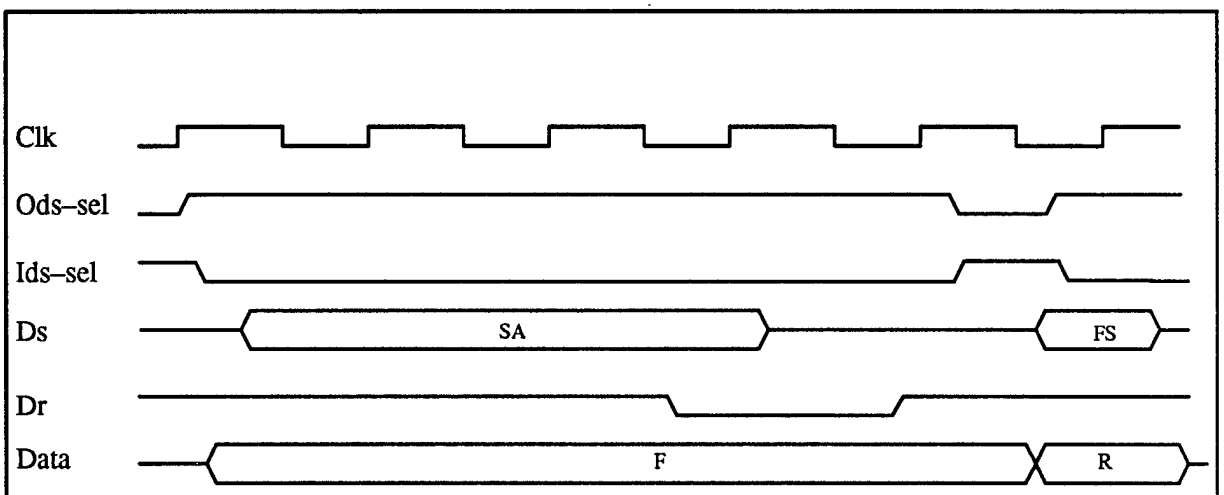


Figure 8. Typical SA Output Access

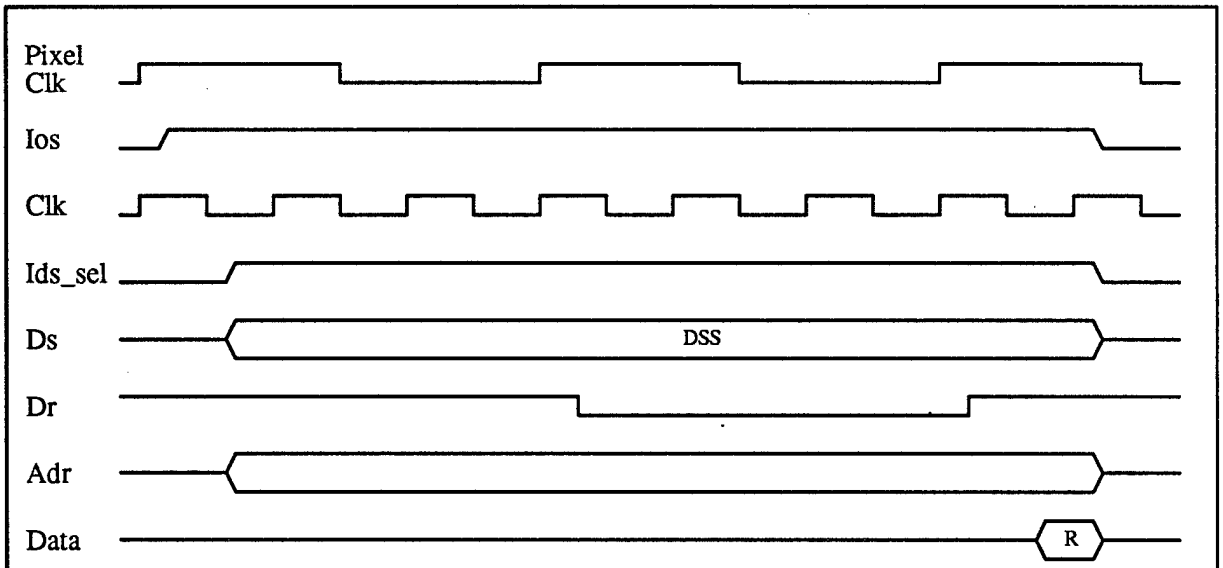


Figure 9. Typical DSS Input Access

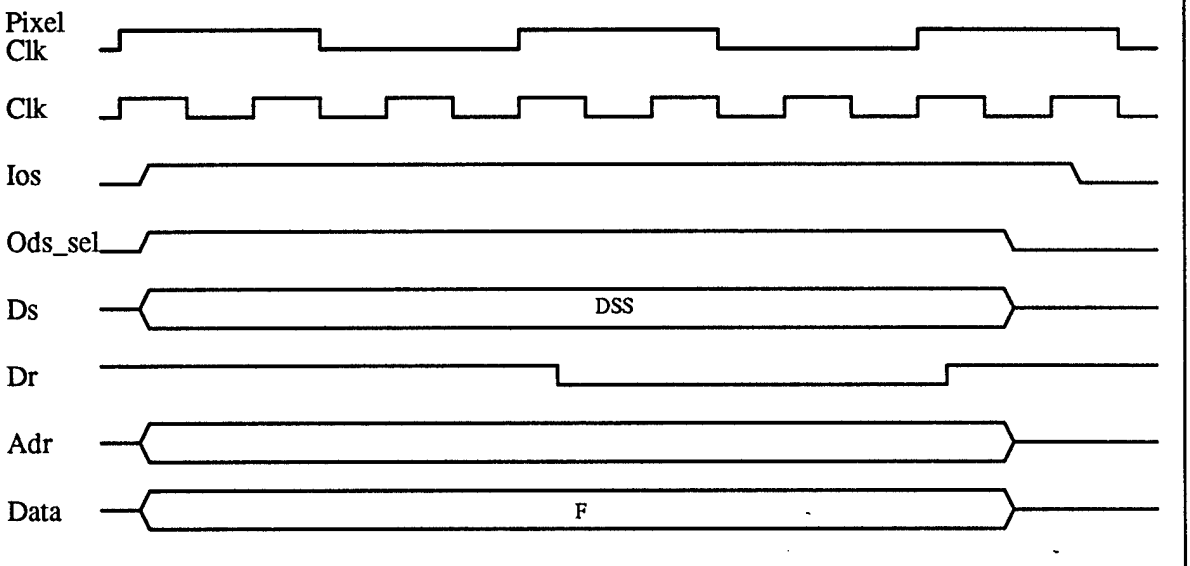


Figure 10. Typical DSS Ouput Access

7. Pin Description

Pin#	Loc.	Signal Name	Abbrev.	Pad Type	Strength	Timing
1	B1	FALSE	FALSE	VSS CORE		
2	C4	Inst[12]	Inst_12	DATA IO	DRVSPEED1,NORM	
3	C2	TRUE	TRUE	VDD EDGE		
4	C3	Inst[13]	Inst_13	DATA IO	DRVSPEED1,NORM	
5	C1	FALSE	FALSE	VSS CORE		
6	D4	Inst[14]	Inst_14	DATA IO	DRVSPEED1,NORM	
7	D2					
8	D3	Inst[15]	Inst_15	DATA IO	DRVSPEED1,NORM	
9	F4	Inst[16]	Inst_16	DATA IO	DRVSPEED1,NORM	
10	G4	Inst[17]	Inst_17	DATA IO	DRVSPEED1,NORM	
11	D1	Inst[18]	Inst_18	DATA IO	DRVSPEED1,NORM	
12	E4	Inst[19]	Inst_19	DATA IO	DRVSPEED1,NORM	
13	E1	Inst[20]	Inst_20	DATA IO	DRVSPEED1,NORM	
14	E3	Inst[21]	Inst_21	DATA IO	DRVSPEED1,NORM	
15	F2	Inst[22]	Inst_22	DATA IO	DRVSPEED1,NORM	
16	E2	Inst[23]	Inst_23	DATA IO	DRVSPEED1,NORM	
17	F1	FALSE	FALSE	VSS EDGE		
18	F3	Inst[24]	Inst_24	DATA IO	DRVSPEED1,NORM	
19	G1	Inst[25]	Inst_25	DATA IO	DRVSPEED1,NORM	
20	G3	FALSE	FALSE	VSS CORE		
21	H2	Inst[26]	Inst_26	DATA IO	DRVSPEED1,NORM	
22	G2	Inst[27]	Inst_27	DATA IO	DRVSPEED1,NORM	
23	H1	TRUE	TRUE	VDD EDGE		
24	H4	Inst[28]	Inst_28	DATA IO	DRVSPEED1,NORM	
25	J1	Inst[29]	Inst_29	DATA IO	DRVSPEED1,NORM	
26	H3	Inst[31]	Inst_31	DATA IO	DRVSPEED1,NORM	
27	J2	Inst[30]	Inst_30	DATA IO	DRVSPEED1,NORM	
28	H5	Inst[32]	Inst_32	DATA IO	DRVSPEED1,NORM	
29	J5	Inst[33]	Inst_33	DATA IO	DRVSPEED1,NORM	
30	K1	Inst[34]	Inst_34	DATA IO	DRVSPEED1,NORM	
31	J4	Inst[35]	Inst_35	DATA IO	DRVSPEED1,NORM	
32	K2	FALSE	FALSE	VSS CORE		
33	J3	Inst[36]	Inst_36	DATA IO	DRVSPEED1,NORM	
34	L1	FALSE	FALSE	VSS EDGE		
35	K3	Inst[37]	Inst_37	DATA IO	DRVSPEED1,NORM	
36	M1	Status[3]	Status_3	DATA IN	NORMAL	
37	K4	Status[4]	Status_4	DATA IN	NORMAL	
38	N1	Inst[40]	Inst_40	DATA IO	DRVSPEED1,NORM	
39	K5	Inst[38]	Inst_38	DATA IO	DRVSPEED1,NORM	
40	M2	Inst[39]	Inst_39	DATA IO	DRVSPEED1,NORM	
41	L3	Pixel_clk	Pxl_clk	DATA IN	NORMAL	
42	P1	Ios	Ios	DATA OUT	DRVSPEED1	
43	L2	N_write[1]	Nwrt_1	DATA OUT	DRVSPEED1	
44	R1	Ncs[2]	Ncs_2	DATA OUT	DRVSPEED1	
45	M3	Read[2]	Read_2	DATA OUT	DRVSPEED1	
46	M4	Write[2]	Write_2	DATA OUT	DRVSPEED1	
47	L4	Ncs[3]	Ncs_3	DATA OUT	DRVSPEED1	
48	P2	Read[3]	Read_3	DATA OUT	DRVSPEED1	

49	N2	Write[3]	Write_3	DATA OUT	DRVSPEED1
50	T1				
51	N3	Ids_freeze	Ids_frz	DATA OUT	DRVSPEED1
52	R2	Ods_freeze	Ods_frz	DATA OUT	DRVSPEED1
53	N4	RFI[2]	RFI_2	DATA IN	NORMAL
54	U1	RFI[3]	RFI_3	DATA IN	NORMAL
55	P3	IAG_test[1]	IAG_tst1	DATA IN	NORMAL
56	T2	RFI[1]	RFI_1	DATA IN	NORMAL
57	T3	IAG_test[0]	IAG_tst0	DATA IN	NORMAL
58	P4	TRUE	TRUE	VDD CORNER	
59	U2	DAV[2]	DAV_2	DATA IN	NORMAL
60	R3	DAV[1]	DAV_1	DATA IN	NORMAL
61	U3	N_read[1]	Nread_1	DATA OUT	DRVSPEED1
62	T4	DAV[3]	DAV_3	DATA IN	NORMAL
63	U4				
64	P5	Ncs[1]	Ncs_1	DATA OUT	DRVSPEED1
65	P6	Ids_sel	Ids_sel	DATA OUT	DRVSPEED1
66	N7	Inst[41]	Inst_41	DATA IO	DRVSPEED1
67	T5	Pc[0]	Pc_0	DATA OUT	DRVSPEED3
68	R4	Pc[2]	Pc_2	DATA OUT	DRVSPEED3
69	U5	FALSE	FALSE	VSS EDGE	
70	R5	TRUE	TRUE	VDD EDGE	
71	T6	Pc[1]	Pc_1	DATA OUT	DRVSPEED3
72	R6	Pc[3]	Pc_3	DATA OUT	DRVSPEED3
73	U6	Pc[4]	Pc_4	DATA OUT	DRVSPEED3
74	P7	Pc[5]	Pc_5	DATA OUT	DRVSPEED3
75	U7	Pc[6]	Pc_6	DATA OUT	DRVSPEED3
76	R7	Pc[7]	Pc_7	DATA OUT	DRVSPEED3
77	T8	Pc[8]	Pc_8	DATA OUT	DRVSPEED3
78	T7	Pc[9]	Pc_9	DATA OUT	DRVSPEED3
79	U8	FALSE	FALSE	VSS EDGE	
80	P8	TRUE	TRUE	VDD EDGE	
81	U9	Pc[10]	Pc_10	DATA OUT	DRVSPEED3
82	R8	Pc[11]	Pc_11	DATA OUT	DRVSPEED3
83	T9	Pc[12]	Pc_12	DATA OUT	DRVSPEED3
84	N8	Pc[13]	Pc_13	DATA OUT	DRVSPEED3
85	N9	TRUE	TRUE	CLOCK VDD	
86	U10	FALSE	FALSE	CLOCK VSS	
87	P9	Clk	Clk	CLOCK	
88	T10	Pc[14]	Pc_14	DATA OUT	DRVSPEED3
89	R9	TRUE	TRUE	VDD EDGE	
90	U11	Pc[15]	Pc_15	DATA OUT	DRVSPEED3
91	R10	Pc[16]	Pc_16	DATA OUT	DRVSPEED3
92	U12	Pc[17]	Pc_17	DATA OUT	DRVSPEED3
93	N10	Pc[18]	Pc_18	DATA OUT	DRVSPEED3
94	T12	Pc[19]	Pc_19	DATA OUT	DRVSPEED3
95	P10	FALSE	FALSE	VSS EDGE	
96	U13	Pc[20]	Pc_20	DATA OUT	DRVSPEED3
97	T11	Pc[21]	Pc_21	DATA OUT	DRVSPEED3
98	T13	Pc[23]	Pc_23	DATA OUT	DRVSPEED3
99	R11	Pc[24]	Pc_24	DATA OUT	DRVSPEED3

100	U14	TRUE	TRUE	VDD EDGE	
101	P11	Pc[22]	Pc_22	DATA OUT	DRVSPEED3
102	U15	Pc[25]	Pc_25	DATA OUT	DRVSPEED3
103	N11	Intr[0]	Intr_0	DATA IN	NORMAL
104	P12	Intr[1]	Intr_1	DATA IN	NORMAL
105	R12	Intr[2]	Intr_2	DATA IN	NORMAL
106	T15				
107	R13	Intr[4]	Intr_4	DATA IN	NORMAL
108	U16	Intr[3]	Intr_3	DATA IN	NORMAL
109	T14	Intr[6]	Intr_6	DATA IN	NORMAL
110	U17	Intr[5]	Intr_5	DATA IN	NORMAL
111	P13	Intr[8]	Intr_8	DATA IN	NORMAL
112	T16	Intr[7]	Intr_7	DATA IN	NORMAL
113	T17	Ods_sel	Ods_sel	DATA OUT	DRVSPEED1
114	R14	FALSE	FALSE	VSS CORNER	
115	R16	Ids_eq_ods_2	Ids_eq_ods2	DATA OUT	DRVSPEED1
116	R15	Guard	Guard	DATA OUT	DRVSPEED1
117	R17	Dr	Dr	DATA IO	DRVSPEED3,NORM
118	P14	Ids_eq_ods_1	Ids_eq_ods1	DATA OUT	DRVSPEED1
119	P16				
120	P15	TRUE	TRUE	VDD CORE	
121	P17	TRUE	TRUE	VDD EDGE	
122	L14	Ods_ids[3]	Oids_3	DATA OUT	DRVSPEED1
123	M14	Ods_ids[2]	Oids_2	DATA OUT	DRVSPEED1
124	N14	Ods_ids[1]	Oids_1	DATA OUT	DRVSPEED1
125	N17	FALSE	FALSE	VSS EDGE	
126	N15	Ods_ids[0]	Oids_0	DATA OUT	DRVSPEED1
127	M16	RF[0]	RF_0	DATA IO	DRVSPEED1,NORM
128	N16	RF[1]	RF_1	DATA IO	DRVSPEED1,NORM
129	M17	RF[2]	RF_2	DATA IO	DRVSPEED1,NORM
130	M15	RF[3]	RF_3	DATA IO	DRVSPEED1,NORM
131	L17	RF[4]	RF_4	DATA IO	DRVSPEED1,NORM
132	L15	RF[5]	RF_5	DATA IO	DRVSPEED1,NORM
133	K16	RF[6]	RF_6	DATA IO	DRVSPEED1,NORM
134	L16	RF[7]	RF_7	DATA IO	DRVSPEED1,NORM
135	K17	TRUE	TRUE	VDD CORE	
136	K14	RF[9]	RF_9	DATA IO	DRVSPEED1,NORM
137	J17	RF[8]	RF_8	DATA IO	DRVSPEED1,NORM
138	K15	TRUE	TRUE	VDD EDGE	
139	J16	RF[10]	RF_10	DATA IO	DRVSPEED1,NORM
140	K13	FALSE	FALSE	VSS EDGE	
141	J13	RF[11]	RF_11	DATA IO	DRVSPEED1,NORM
142	H17	RF[12]	RF_12	DATA IO	DRVSPEED1,NORM
143	J14	RF[13]	RF_13	DATA IO	DRVSPEED1,NORM
144	H16	Zero	Zero	DATA IN	NORMAL
145	J15	Sign	Sign	DATA IN	NORMAL
146	G17	Carry	Carry	DATA IN	NORMAL
147	H15	Flush	Flush	DATA OUT	DRVSPEED1
148	F17	ALU_Flag	ALU_Flag	DATA IN	NORMAL
149	H14	RF[14]	RF_14	DATA IO	DRVSPEED1,NORM
150	F14	RF[16]	RF_16	DATA IO	DRVSPEED1,NORM

151	H13	RF[17]	RF_17	DATA IO	DRVSPEED1,NORM
152	F16	RF[19]	RF_19	DATA IO	DRVSPEED1,NORM
153	G15	RF[15]	RF_15	DATA IO	DRVSPEED1,NORM
154	D17	TRUE	TRUE	VDD CORE	
155	G16	RF[18]	RF_18	DATA IO	DRVSPEED1,NORM
156	C17	Inst[43]	Inst_43	DATA IO	DRVSPEED1,NORM
157	F15	RF[20]	RF_20	DATA IO	DRVSPEED1,NORM
158	D16	RF[21]	RF_21	DATA IO	DRVSPEED1,NORM
159	G14	Inst[42]	Inst_42	DATA IO	DRVSPEED1,NORM
160	F14				
161	E16	TRUE	TRUE	VDD EDGE	
162	B17	RF[22]	RF_22	DATA IO	DRVSPEED1,NORM
163	E15	FALSE	FALSE	VSS EDGE	
164	C16	ALU_opcode[7]	ALUop_7	DATA OUT	DRVSPEED1
165	E14	ALU_opcode[6]	ALUop_6	DATA OUT	DRVSPEED1
166	A17	RF[23]	RF_23	DATA IO	DRVSPEED1,NORM
167	D15	TRUE	TRUE	VDD CORE	
168	B16	RF[24]	RF_24	DATA IO	DRVSPEED1,NORM
169	B15	RF[25]	RF_25	DATA IO	DRVSPEED1,NORM
170	D14	TRUE	TRUE	VDD CORNER	
171	A16	ALU_opcode[0]	ALUop_0	DATA OUT	DRVSPEED1
172	C15	ALU_opcode[1]	ALUop_1	DATA OUT	DRVSPEED1
173	A15	ALU_opcode[3]	ALUop_3	DATA OUT	DRVSPEED1
174	B14	ALU_opcode[4]	ALUop_4	DATA OUT	DRVSPEED1
175	A14				
176	D13	ALU_opcode[5]	ALUop_5	DATA OUT	DRVSPEED1
177	D12	Inst[44]	Inst_44	DATA IO	DRVSPEED1,NORM
178	E11	Inst[45]	Inst_45	DATA IO	DRVSPEED1,NORM
179	B13	RF[26]	RF_26	DATA IO	DRVSPEED1,NORM
180	C14	RF[27]	RF_27	DATA IO	DRVSPEED1,NORM
181	A13	ALU_opcode[2]	ALUop_2	DATA OUT	DRVSPEED1
182	C13	RF[28]	RF_28	DATA IO	DRVSPEED1,NORM
183	B12	RF[29]	RF_29	DATA IO	DRVSPEED1,NORM
184	C12	RF[30]	RF_30	DATA IO	DRVSPEED1,NORM
185	A12	RF[31]	RF_31	DATA IO	DRVSPEED1,NORM
186	D11	Valid_intr_pulse	Vintr_p	DATA OUT	DRVSPEED1
187	A11	TRUE	TRUE	VDD EDGE	
188	C11	FALSE	FALSE	VSS EDGE	
189	B10	Inst_rdy	Inst_rdy	DATA IN	NORMAL
190	B11	DAG_error	DAG_err	DATA IN	NORMAL
191	A10	N_reset	N_reset	DATA IN	NORMAL
192	D10	R_eq_f_1	Reqf_1	DATA IN	NORMAL
193	A9	Inst_rd	Inst_rd	DATA OUT	DRVSPEED1
194	C10	Freeze	Freeze	DATA OUT	DRVSPEED1
195	B9	N_inst_wr	Ninst_wr	DATA OUT	DRVSPEED1
196	E10	Status[0]	Status_0	DATA IN	NORMAL
197	E9	Kernel_mode	Krnl_md	DATA OUT	DRVSPEED1
198	A8	TRUE	TRUE	VDD EDGE	
199	D9	Status[1]	Status_1	DATA IN	NORMAL
200	B8	N_reset_out	Nrst_out	DATA OUT	DRVSPEED1
201	C9	Inst_en	Inst_en	DATA OUT	DRVSPEED1

202	A7	DAG_R_en	DAG_R_en	DATA OUT	DRVSPEED1
203	C8	N_cs_pha	Ncs_pha	DATA OUT	DRVSPEED1
204	A6	N_cs_phb	Ncs_phb	DATA OUT	DRVSPEED1
205	E8	R_eq_f_2	Reqf_2	DATA IN	NORMAL
206	B6	S_eq_f_1	Seqf_1	DATA IN	NORMAL
207	D8	S_eq_f_2	Seqf_2	DATA IN	NORMAL
208	A5	Booting	Booting	DATA OUT	DRVSPEED1
209	B7	Inst[0]	Inst_0	DATA IO	DRVSPEED1,NORM
210	B5	Inst[1]	Inst_1	DATA IO	DRVSPEED1,NORM
211	C7	FALSE	FALSE	VSS EDGE	
212	A4	Status[2]	Status_2	DATA IN	NORMAL
213	D7	Inst[2]	Inst_2	DATA IO	DRVSPEED1,NORM
214	D6	Inst[3]	Inst_3	DATA IO	DRVSPEED1,NORM
215	E7	Inst[4]	Inst_4	DATA IO	DRVSPEED1,NORM
216	A3				
217	C6	Inst[6]	Inst_6	DATA IO	DRVSPEED1,NORM
218	B3	Inst[5]	Inst_5	DATA IO	DRVSPEED1,NORM
219	C5	Inst[7]	Inst_7	DATA IO	DRVSPEED1,NORM
220	A2	FALSE	FALSE	VSS EDGE	
221	B4	Inst[9]	Inst_9	DATA IO	DRVSPEED1,NORM
222	A1	Inst[8]	Inst_8	DATA IO	DRVSPEED1,NORM
223	D5	Inst[11]	Inst_11	DATA IO	DRVSPEED1,NORM
224	B2	Inst[10]	Inst_10	DATA IO	DRVSPEED1,NORM

8. Key Parameters

```
) Key Parameters for Chip /tmp_mnt/net/yoda/mnta/iag/iag/gt_vic/iag
) ================================================================================
)
) TIME = Mon Feb  4 15:02:45 1991
)
) ROUTE_VERSION = 8.00
) HEIGHT = 426.5 MILS
)    ( = 10833.1 u )
) WIDTH = 417.4 MILS
)    ( = 10601.9 u )
) ROUTED = 1 (0=NO,1=YES)
) TOTAL_WIRE_LENGTH = 1972764 MILS
)    ( = 50108205. u )
) CORE_AREA = 140707.9 SQUARE_MILS
)    ( = 90779114.4 u2 )
) PADRING_AREA = 37329.1 SQUARE_MILS
)    ( = 24083243. u2 )
) PAD_AREA = 33988.2 SQUARE_MILS
)    ( = 21927827. u2 )
) ROUTE_AREA = 103308.9 SQUARE_MILS
)    ( = 66650770.1 u2 )
) PERCENT_ROUTING_OF_CORE = 73 %
) PERCENT_ROUTING_OF_CHIP = 58 %
) PERCENT_CORE_OF_CHIP = 79 %
) PERCENT_PADRING_OF_CHIP = 20 %
) PERCENT_PAD_OF_PADRING = 91 %
```

```
)
) NETLIST_VERSION = 2.0
) NETLIST_EXISTS = 1 (0=NO,1=YES)
)
) PHASE_A_TIME = 42.6 NANOSECONDS
) PHASE_B_TIME = 46.3 NANOSECONDS
) SYMMETRIC_TIME = 92.6 NANOSECONDS
) NUMBER_OF_TRANSISTORS = 65190
) Key Parameters (set 124) Modified
) POWER_DISSIPATION = 1180.46 MILLIWATTS_@5V_10MHZ
)
)
) ROUTE_ESTIMATE_LVL = 0
) FLAT_ROUTE = 0 (0=NO,1=YES)
) TECHNOLOGY_NAME = CMOS-1
) PACKAGE_SPECIFIED = 1 (0=NO,1=YES)
) PACKAGE_NAME = CPGA224f2
) FABLINE_NAME = HP2_CN10B
) COMPILER_TYPE = GCX
)
) FLOORPLAN_VERSION = 8.0
) BOND_PAD_CNT = 216
) HEIGHT_ESTIMATE = 354.27 MILS
)    ( = 8998.457 u )
) WIDTH_ESTIMATE = 399.68 MILS
)    ( = 10151.87 u )
) FUSED = 1 (0=NO,1=YES)
) FUSION_REQUIRED = 1 (0=NO,1=YES)
) PINOUT = 1 (0=NO,1=YES)
) PINOUT_REQUIRED = 1 (0=NO,1=YES)
) PLACED = 1 (0=NO,1=YES)
) PLACEMENT_REQUIRED = 1 (0=NO,1=YES)
)
)
) DOWN_BONDS_ALLOWED = 1 (0=NO,1=YES)
) PKG_PIN_COUNT = 224
) PKG_WELL_HEIGHT = 480.00 MILS
)    ( = 12192.00 u )
) PKG_WELL_WIDTH = 480.00 MILS
)    ( = 12192.00 u )
) AREA = 178021.1 SQUARE_MILS
)    ( = 114852090. u2 )
) OBJECT_TYPE = Chip
) AREA_PER_TRANSISTOR = 2.730804 SQUARE_MILS
)    ( = 1761.80552 u2 )
) PHYSICAL_IMPLEMENTATIONS_EXIST = 0 (0=NO,1=YES)
) CHECKPOINTS_EXIST = 0 (0=NO,1=YES)
) CAN_SET_FABLINE = 1 (0=NO,1=YES)
)
) Key Parameter Listing Complete
```

9. PADRING.033

OUTPUT RINGS REPORT Version 1

Noise contribution:(ma/nh) Speed0: 2.50 Speed1: 5.00 Speed2: 8.33 Speed3: 16.66
Limits: Maximum noise level: 100. Unacceptable level: 150

Combined power pads do not supply clean power to the core.
Their use is discouraged

Ring under analysis: VDD

	PAD NAME	EDGE	SPEED	DRIVE TYPE	PAD SUPPLY	COMMENT
WARNING:	pc_pad[13]	NORTH	3	CMOS	0	EXCESSIVE NOISE LEVEL
	pc_pad[12]	NORTH	3	CMOS	1	OK
	pc_pad[11]	NORTH	3	CMOS	1	OK
	pc_pad[10]	NORTH	3	CMOS	1	OK
	edge_vdd[8]	NORTH		POWER		
	pc_pad[9]	NORTH	3	CMOS	1	OK
	pc_pad[8]	NORTH	3	CMOS	1	OK
	pc_pad[7]	NORTH	3	CMOS	1	OK
WARNING:	pc_pad[6]	NORTH	3	CMOS	0	EXCESSIVE NOISE LEVEL
WARNING:	pc_pad[5]	NORTH	3	CMOS	0	EXCESSIVE NOISE LEVEL
	pc_pad[4]	NORTH	3	CMOS	1	OK
	pc_pad[3]	NORTH	3	CMOS	1	OK
	pc_pad[1]	NORTH	3	CMOS	2	OK
	edge_vdd[2]	NORTH		POWER		
	pc_pad[2]	NORTH	3	CMOS	2	OK
	pc_pad[0]	NORTH	3	CMOS	2	OK
	inst5_pad[1]	NORTH	1	CMOS	2	OK
	ids_sel_pad	NORTH	1	CMOS	2	OK
	dev1_pads[0]	NORTH	1	CMOS	2	OK
	dev1_pads[1]	NORTH	1	CMOS	1	OK
	corner_vdd[0]	NORTH		POWER		
	io_freeze_pad[1]	EAST	1	CMOS	1	OK
	io_freeze_pad[0]	EAST	1	CMOS	1	OK
	dev3_pads[2]	EAST	1	CMOS	1	OK
	dev3_pads[1]	EAST	1	CMOS	1	OK
	dev3_pads[0]	EAST	1	CMOS	1	OK
	dev2_pads[2]	EAST	1	CMOS	1	OK
WARNING:	dev2_pads[1]	EAST	1	CMOS	0	EXCESSIVE NOISE LEVEL
WARNING:	dev2_pads[0]	EAST	1	CMOS	0	EXCESSIVE NOISE LEVEL
WARNING:	dev1_pads[2]	EAST	1	CMOS	0	EXCESSIVE NOISE LEVEL
WARNING:	ios_pad	EAST	1	CMOS	0	EXCESSIVE NOISE LEVEL
WARNING:	inst4_pad[7]	EAST	1	CMOS	0	EXCESSIVE NOISE LEVEL
WARNING:	inst4_pad[6]	EAST	1	CMOS	0	EXCESSIVE NOISE LEVEL
WARNING:	inst5_pad[0]	EAST	1	CMOS	0	EXCESSIVE NOISE LEVEL

inst4_pad[5]	EAST	1	CMOS	1	OK
inst4_pad[4]	EAST	1	CMOS	1	OK
inst4_pad[3]	EAST	1	CMOS	1	OK
inst4_pad[2]	EAST	1	CMOS	1	OK
inst4_pad[1]	EAST	1	CMOS	1	OK
inst4_pad[0]	EAST	1	CMOS	1	OK
inst3_pad[6]	EAST	1	CMOS	1	OK
inst3_pad[7]	EAST	1	CMOS	1	OK
inst3_pad[5]	EAST	1	CMOS	1	OK
inst3_pad[4]	EAST	1	CMOS	1	OK
edge_vdd[1]	EAST		POWER		
inst3_pad[3]	EAST	1	CMOS	1	OK
inst3_pad[2]	EAST	1	CMOS	1	OK
inst3_pad[1]	EAST	1	CMOS	1	OK
inst3_pad[0]	EAST	1	CMOS	1	OK
inst2_pad[7]	EAST	1	CMOS	2	OK
inst2_pad[6]	EAST	1	CMOS	2	OK
inst2_pad[5]	EAST	1	CMOS	2	OK
inst2_pad[4]	EAST	1	CMOS	2	OK
inst2_pad[3]	EAST	1	CMOS	2	OK
inst2_pad[2]	EAST	1	CMOS	2	OK
inst2_pad[1]	EAST	1	CMOS	1	OK
inst2_pad[0]	EAST	1	CMOS	1	OK
inst1_pad[7]	EAST	1	CMOS	1	OK
inst1_pad[6]	EAST	1	CMOS	1	OK
edge_vdd[0]	EAST		POWER		
inst1_pad[5]	EAST	1	CMOS	1	OK
inst1_pad[4]	EAST	1	CMOS	1	OK
inst1_pad[3]	SOUTH	1	CMOS	1	OK
inst1_pad[2]	SOUTH	1	CMOS	1	OK
inst1_pad[1]	SOUTH	1	CMOS	1	OK
inst1_pad[0]	SOUTH	1	CMOS	1	OK
inst0_pad[7]	SOUTH	1	CMOS	1	OK
inst0_pad[6]	SOUTH	1	CMOS	1	OK
inst0_pad[5]	SOUTH	1	CMOS	1	OK
inst0_pad[4]	SOUTH	1	CMOS	1	OK
inst0_pad[3]	SOUTH	1	CMOS	1	OK
inst0_pad[2]	SOUTH	1	CMOS	1	OK
inst0_pad[1]	SOUTH	1	CMOS	1	OK
inst0_pad[0]	SOUTH	1	CMOS	1	OK
boot_pad	SOUTH	1	CMOS	2	OK
csb_pad	SOUTH	1	CMOS	2	OK
csa_pad	SOUTH	1	CMOS	2	OK
dag_r_en_pad	SOUTH	1	CMOS	2	OK
inst_drv_pad	SOUTH	1	CMOS	2	OK
reset_out_pad	SOUTH	1	CMOS	2	OK
edge_vdd[7]	SOUTH		POWER		
kernel_mode_pad	SOUTH	1	CMOS	2	OK
n_inst_wr_pad	SOUTH	1	CMOS	2	OK
freeze_pad	SOUTH	1	CMOS	2	OK
inst_rd_pad	SOUTH	1	CMOS	2	OK
edge_vdd[6]	SOUTH		POWER		
valid_intr_pad	SOUTH	1	CMOS	2	OK

fr3_pad[7]	SOUTH	1	CMOS	2	OK
fr3_pad[6]	SOUTH	1	CMOS	2	OK
fr3_pad[5]	SOUTH	1	CMOS	2	OK
fr3_pad[4]	SOUTH	1	CMOS	2	OK
alu_op_pad[2]	SOUTH	1	CMOS	2	OK
fr3_pad[3]	SOUTH	1	CMOS	2	OK
fr3_pad[2]	SOUTH	1	CMOS	2	OK
inst5_pad[5]	SOUTH	1	CMOS	2	OK
inst5_pad[4]	SOUTH	1	CMOS	2	OK
alu_op_pad[5]	SOUTH	1	CMOS	2	OK
alu_op_pad[3]	SOUTH	1	CMOS	2	OK
alu_op_pad[4]	SOUTH	1	CMOS	2	OK
alu_op_pad[0]	SOUTH	1	CMOS	2	OK
alu_op_pad[1]	SOUTH	1	CMOS	2	OK
fr3_pad[1]	SOUTH	1	CMOS	2	OK
corner_vdd[1]	SOUTH		POWER		
fr3_pad[0]	WEST	1	CMOS	2	OK
alu_op_pad[6]	WEST	1	CMOS	2	OK
fr2_pad[7]	WEST	1	CMOS	2	OK
alu_op_pad[7]	WEST	1	CMOS	2	OK
edge_vdd[5]	WEST		POWER		
fr2_pad[6]	WEST	1	CMOS	2	OK
inst5_pad[2]	WEST	1	CMOS	2	OK
fr2_pad[5]	WEST	1	CMOS	2	OK
fr2_pad[4]	WEST	1	CMOS	2	OK
inst5_pad[3]	WEST	1	CMOS	2	OK
fr2_pad[2]	WEST	1	CMOS	2	OK
fr1_pad[7]	WEST	1	CMOS	2	OK
fr2_pad[3]	WEST	1	CMOS	2	OK
fr2_pad[1]	WEST	1	CMOS	2	OK
fr2_pad[0]	WEST	1	CMOS	2	OK
fr1_pad[6]	WEST	1	CMOS	1	OK
flush_pad	WEST	1	CMOS	1	OK
fr1_pad[5]	WEST	1	CMOS	1	OK
fr1_pad[4]	WEST	1	CMOS	1	OK
fr1_pad[3]	WEST	1	CMOS	1	OK
fr1_pad[2]	WEST	1	CMOS	1	OK
edge_vdd[4]	WEST		POWER		
fr1_pad[0]	WEST	1	CMOS	1	OK
fr1_pad[1]	WEST	1	CMOS	1	OK
fr0_pad[7]	WEST	1	CMOS	1	OK
fr0_pad[6]	WEST	1	CMOS	1	OK
fr0_pad[5]	WEST	1	CMOS	1	OK
fr0_pad[4]	WEST	1	CMOS	2	OK
fr0_pad[3]	WEST	1	CMOS	2	OK
fr0_pad[2]	WEST	1	CMOS	2	OK
fr0_pad[1]	WEST	1	CMOS	2	OK
fr0_pad[0]	WEST	1	CMOS	2	OK
ods_ids_pad[0]	WEST	1	CMOS	1	OK
ods_ids_pad[1]	WEST	1	CMOS	1	OK
ods_ids_pad[2]	WEST	1	CMOS	1	OK
ods_ids_pad[3]	WEST	1	CMOS	1	OK
edge_vdd[10]	WEST		POWER		

```
          dr_pad          WEST    3  CMOS      1   OK
          ideqod_pad[0]   WEST    1  CMOS      1   OK
          ideqod_pad[1]   WEST    1  CMOS      2   OK
          guard_pad       WEST    1  CMOS      2   OK
          ods_sel_pad     WEST    1  CMOS      2   OK

          pc_pad[25]      NORTH   3  CMOS      2   OK
          pc_pad[22]      NORTH   3  CMOS      1   OK
          edge_vdd[3]     NORTH      POWER
          pc_pad[24]      NORTH   3  CMOS      1   OK
          pc_pad[23]      NORTH   3  CMOS      1   OK
          pc_pad[21]      NORTH   3  CMOS      1   OK

WARNING:  pc_pad[20]      NORTH   3  CMOS      0   EXCESSIVE NOISE LEVEL

          pc_pad[19]      NORTH   3  CMOS      1   OK
          pc_pad[18]      NORTH   3  CMOS      1   OK
          pc_pad[17]      NORTH   3  CMOS      1   OK
          pc_pad[16]      NORTH   3  CMOS      1   OK
          pc_pad[15]      NORTH   3  CMOS      1   OK
          edge_vdd[9]     NORTH      POWER
          pc_pad[14]      NORTH   3  CMOS      1   OK

This ring has 2 more VDD pads than it needs
 Ring under analysis: VSS

          PAD NAME        EDGE  SPEED DRIVE PAD     COMMENT
                                      TYPE  SUPPLY
-------------------------------------------------------------------------------

WARNING:  pc_pad[13]      NORTH   3  CMOS      0   EXCESSIVE NOISE LEVEL

          pc_pad[12]      NORTH   3  CMOS      1   OK
          pc_pad[11]      NORTH   3  CMOS      1   OK
          pc_pad[10]      NORTH   3  CMOS      1   OK
          edge_vss[10]    NORTH      POWER
          pc_pad[9]       NORTH   3  CMOS      1   OK
          pc_pad[8]       NORTH   3  CMOS      1   OK
          pc_pad[7]       NORTH   3  CMOS      1   OK

WARNING:  pc_pad[6]       NORTH   3  CMOS      0   EXCESSIVE NOISE LEVEL

WARNING:  pc_pad[5]       NORTH   3  CMOS      0   EXCESSIVE NOISE LEVEL

          pc_pad[4]       NORTH   3  CMOS      1   OK
          pc_pad[3]       NORTH   3  CMOS      1   OK
          pc_pad[1]       NORTH   3  CMOS      1   OK
          edge_vss[9]     NORTH      POWER
          pc_pad[2]       NORTH   3  CMOS      1   OK
          pc_pad[0]       NORTH   3  CMOS      1   OK
          inst5_pad[1]    NORTH   1  CMOS      1   OK
          ids_sel_pad     NORTH   1  CMOS      1   OK
          dev1_pads[0]    NORTH   1  CMOS      1   OK

WARNING:  dev1_pads[1]    NORTH   1  CMOS      0   EXCESSIVE NOISE LEVEL

WARNING:  io_freeze_pad[1]EAST    1  CMOS      0   EXCESSIVE NOISE LEVEL

WARNING:  io_freeze_pad[0]EAST    1  CMOS      0   EXCESSIVE NOISE LEVEL
```

```
WARNING:  dev3_pads[2]    EAST    1  CMOS      0   EXCESSIVE NOISE LEVEL
WARNING:  dev3_pads[1]    EAST    1  CMOS      0   EXCESSIVE NOISE LEVEL
          dev3_pads[0]    EAST    1  CMOS      1   OK
          dev2_pads[2]    EAST    1  CMOS      1   OK
          dev2_pads[1]    EAST    1  CMOS      1   OK
          dev2_pads[0]    EAST    1  CMOS      1   OK
          dev1_pads[2]    EAST    1  CMOS      1   OK
          ios_pad         EAST    1  CMOS      1   OK
          inst4_pad[7]    EAST    1  CMOS      1   OK
          inst4_pad[6]    EAST    1  CMOS      1   OK
          inst5_pad[0]    EAST    1  CMOS      1   OK
          inst4_pad[5]    EAST    1  CMOS      1   OK
          edge_vss[8]     EAST       POWER
          inst4_pad[4]    EAST    1  CMOS      1   OK
          inst4_pad[3]    EAST    1  CMOS      1   OK
          inst4_pad[2]    EAST    1  CMOS      1   OK
          inst4_pad[1]    EAST    1  CMOS      2   OK
          inst4_pad[0]    EAST    1  CMOS      2   OK
          inst3_pad[6]    EAST    1  CMOS      2   OK
          inst3_pad[7]    EAST    1  CMOS      2   OK
          inst3_pad[5]    EAST    1  CMOS      2   OK
          inst3_pad[4]    EAST    1  CMOS      2   OK
          inst3_pad[3]    EAST    1  CMOS      2   OK
          inst3_pad[2]    EAST    1  CMOS      1   OK
          inst3_pad[1]    EAST    1  CMOS      1   OK
          inst3_pad[0]    EAST    1  CMOS      1   OK
          edge_vss[7]     EAST       POWER
          inst2_pad[7]    EAST    1  CMOS      1   OK
          inst2_pad[6]    EAST    1  CMOS      1   OK
          inst2_pad[5]    EAST    1  CMOS      1   OK
          inst2_pad[4]    EAST    1  CMOS      1   OK
          inst2_pad[3]    EAST    1  CMOS      1   OK
          inst2_pad[2]    EAST    1  CMOS      1   OK
          inst2_pad[1]    EAST    1  CMOS      1   OK
          inst2_pad[0]    EAST    1  CMOS      2   OK
          inst1_pad[7]    EAST    1  CMOS      2   OK
          inst1_pad[6]    EAST    1  CMOS      2   OK
          inst1_pad[5]    EAST    1  CMOS      1   OK
          inst1_pad[4]    EAST    1  CMOS      1   OK
          inst1_pad[3]    SOUTH   1  CMOS      2   OK
          inst1_pad[2]    SOUTH   1  CMOS      2   OK
          inst1_pad[1]    SOUTH   1  CMOS      2   OK
          inst1_pad[0]    SOUTH   1  CMOS      2   OK
          inst0_pad[7]    SOUTH   1  CMOS      2   OK
          edge_vss[0]     SOUTH      POWER
          inst0_pad[6]    SOUTH   1  CMOS      2   OK
          inst0_pad[5]    SOUTH   1  CMOS      2   OK
          inst0_pad[4]    SOUTH   1  CMOS      2   OK
          inst0_pad[3]    SOUTH   1  CMOS      2   OK
          inst0_pad[2]    SOUTH   1  CMOS      2   OK
          edge_vss[6]     SOUTH      POWER
          inst0_pad[1]    SOUTH   1  CMOS      2   OK
          inst0_pad[0]    SOUTH   1  CMOS      2   OK
```

boot_pad	SOUTH	1	CMOS	3	OK
csb_pad	SOUTH	1	CMOS	3	OK
csa_pad	SOUTH	1	CMOS	3	OK
dag_r_en_pad	SOUTH	1	CMOS	2	OK
inst_drv_pad	SOUTH	1	CMOS	2	OK
reset_out_pad	SOUTH	1	CMOS	2	OK
kernel_mode_pad	SOUTH	1	CMOS	2	OK
n_inst_wr_pad	SOUTH	1	CMOS	2	OK
freeze_pad	SOUTH	1	CMOS	1	OK
inst_rd_pad	SOUTH	1	CMOS	1	OK
edge_vss[5]	SOUTH		POWER		
valid_intr_pad	SOUTH	1	CMOS	1	OK
fr3_pad[7]	SOUTH	1	CMOS	1	OK
fr3_pad[6]	SOUTH	1	CMOS	1	OK
fr3_pad[5]	SOUTH	1	CMOS	1	OK
fr3_pad[4]	SOUTH	1	CMOS	1	OK
alu_op_pad[2]	SOUTH	1	CMOS	1	OK
fr3_pad[3]	SOUTH	1	CMOS	1	OK
fr3_pad[2]	SOUTH	1	CMOS	1	OK
inst5_pad[5]	SOUTH	1	CMOS	1	OK
inst5_pad[4]	SOUTH	1	CMOS	2	OK
alu_op_pad[5]	SOUTH	1	CMOS	1	OK
alu_op_pad[3]	SOUTH	1	CMOS	1	OK
alu_op_pad[4]	SOUTH	1	CMOS	1	OK
alu_op_pad[0]	SOUTH	1	CMOS	1	OK
alu_op_pad[1]	SOUTH	1	CMOS	1	OK
fr3_pad[1]	SOUTH	1	CMOS	1	OK
fr3_pad[0]	WEST	1	CMOS	1	OK
alu_op_pad[6]	WEST	1	CMOS	1	OK
fr2_pad[7]	WEST	1	CMOS	1	OK
edge_vss[4]	WEST		POWER		
alu_op_pad[7]	WEST	1	CMOS	1	OK
fr2_pad[6]	WEST	1	CMOS	1	OK
inst5_pad[2]	WEST	1	CMOS	1	OK
fr2_pad[5]	WEST	1	CMOS	1	OK
fr2_pad[4]	WEST	1	CMOS	1	OK
inst5_pad[3]	WEST	1	CMOS	1	OK
fr2_pad[2]	WEST	1	CMOS	2	OK
fr1_pad[7]	WEST	1	CMOS	2	OK
fr2_pad[3]	WEST	1	CMOS	2	OK
fr2_pad[1]	WEST	1	CMOS	2	OK
fr2_pad[0]	WEST	1	CMOS	1	OK
fr1_pad[6]	WEST	1	CMOS	1	OK
flush_pad	WEST	1	CMOS	1	OK
fr1_pad[5]	WEST	1	CMOS	1	OK
fr1_pad[4]	WEST	1	CMOS	1	OK
fr1_pad[3]	WEST	1	CMOS	1	OK
edge_vss[3]	WEST		POWER		
fr1_pad[2]	WEST	1	CMOS	1	OK
fr1_pad[0]	WEST	1	CMOS	1	OK
fr1_pad[1]	WEST	1	CMOS	1	OK
fr0_pad[7]	WEST	1	CMOS	2	OK
fr0_pad[6]	WEST	1	CMOS	2	OK

```
          fr0_pad[5]      WEST    1  CMOS      2   OK
          fr0_pad[4]      WEST    1  CMOS      2   OK
          fr0_pad[3]      WEST    1  CMOS      2   OK
          fr0_pad[2]      WEST    1  CMOS      2   OK
          fr0_pad[1]      WEST    1  CMOS      2   OK
          fr0_pad[0]      WEST    1  CMOS      1   OK
          ods_ids_pad[0]  WEST    1  CMOS      1   OK
          edge_vss[2]     WEST       POWER
          ods_ids_pad[1]  WEST    1  CMOS      1   OK
          ods_ids_pad[2]  WEST    1  CMOS      1   OK
          ods_ids_pad[3]  WEST    1  CMOS      1   OK
          dr_pad          WEST    3  CMOS      1   OK
          ideqod_pad[0]   WEST    1  CMOS      2   OK
          ideqod_pad[1]   WEST    1  CMOS      2   OK
          guard_pad       WEST    1  CMOS      2   OK
          ods_sel_pad     WEST    1  CMOS      2   OK
          corner_vss[0]   WEST       POWER

          pc_pad[25]      NORTH   3  CMOS      1   OK
          pc_pad[22]      NORTH   3  CMOS      1   OK
          pc_pad[24]      NORTH   3  CMOS      1   OK
          pc_pad[23]      NORTH   3  CMOS      2   OK
          pc_pad[21]      NORTH   3  CMOS      1   OK
          pc_pad[20]      NORTH   3  CMOS      1   OK
          edge_vss[1]     NORTH      POWER
          pc_pad[19]      NORTH   3  CMOS      1   OK
          pc_pad[18]      NORTH   3  CMOS      1   OK
          pc_pad[17]      NORTH   3  CMOS      1   OK
WARNING:  pc_pad[16]      NORTH   3  CMOS      0   EXCESSIVE NOISE LEVEL
WARNING:  pc_pad[15]      NORTH   3  CMOS      0   EXCESSIVE NOISE LEVEL
WARNING:  pc_pad[14]      NORTH   3  CMOS      0   EXCESSIVE NOISE LEVEL
This ring has 1 more VSS pad  than it needs

Noise Level can be reduced by adding more ring power pads
or using slower speed output pads.
```

10. Power Dissipation

```
) Total power consumption (5.5V, 0 DegC 50pf/out_pad):
)       DC:         114.84mW [114.84(core)+0.00(ring)]
)       AC@10MHz:   1089.71mW [413.59(core)+676.12(ring)]
```

11. Simulation Setup Files

11.1. designinit.080

```
func designinit {
               toggle /Clk 0 '(0 5 10)
               tag /Clk step both
```

```
        tag /Clk cycle falling
                    }
```

12. Timing Setup Files

12.1. basic.040

```
LABEL Input constraints from other chips
HOLDTIME_MARGIN 2.00
SELECT_EXT_CLOCK Clk
INPUT DAG_error 1 0 19.80 0.00 0.00 0.00
INPUT ALU_Flag 1 0 21.50 0.00 0.00 0.00
INPUT Carry 1 0 21.50 0.00 0.00 0.00
INPUT R_eq_f_1 1 0 58.30 0.00 8.30 0.00
INPUT R_eq_f_2 1 0 58.30 0.00 8.30 0.00
INPUT S_eq_f_1 1 0 57.90 0.00 7.90 0.00
INPUT S_eq_f_2 1 0 57.90 0.00 7.90 0.00
INPUT R_eq_f_1 0 1 8.30 0.00 0.00 0.00
INPUT R_eq_f_2 0 1 8.30 0.00 0.00 0.00
INPUT S_eq_f_1 0 1 7.90 0.00 0.00 0.00
INPUT S_eq_f_2 0 1 7.90 0.00 0.00 0.00
INPUT Sign 1 0 21.50 0.00 0.00 0.00
INPUT Zero 1 0 21.50 0.00 0.00 0.00
INPUT RF[0] 1 0 40.50 0.00 0.00 0.00
INPUT RF[1] 1 0 40.50 0.00 0.00 0.00
INPUT RF[2] 1 0 40.50 0.00 0.00 0.00
INPUT RF[3] 1 0 40.50 0.00 0.00 0.00
INPUT RF[4] 1 0 40.50 0.00 0.00 0.00
INPUT RF[5] 1 0 40.50 0.00 0.00 0.00
INPUT RF[6] 1 0 40.50 0.00 0.00 0.00
INPUT RF[7] 1 0 40.50 0.00 0.00 0.00
INPUT RF[8] 1 0 40.50 0.00 0.00 0.00
INPUT RF[9] 1 0 40.50 0.00 0.00 0.00
INPUT RF[10] 1 0 40.50 0.00 0.00 0.00
INPUT RF[11] 1 0 40.50 0.00 0.00 0.00
INPUT RF[12] 1 0 40.50 0.00 0.00 0.00
INPUT RF[13] 1 0 40.50 0.00 0.00 0.00
INPUT RF[14] 1 0 40.50 0.00 0.00 0.00
INPUT RF[15] 1 0 40.50 0.00 0.00 0.00
INPUT RF[16] 1 0 40.50 0.00 0.00 0.00
INPUT RF[17] 1 0 40.50 0.00 0.00 0.00
INPUT RF[18] 1 0 40.50 0.00 0.00 0.00
INPUT RF[19] 1 0 40.50 0.00 0.00 0.00
INPUT RF[20] 1 0 40.50 0.00 0.00 0.00
INPUT RF[21] 1 0 40.50 0.00 0.00 0.00
INPUT RF[22] 1 0 40.50 0.00 0.00 0.00
INPUT RF[23] 1 0 40.50 0.00 0.00 0.00
INPUT RF[24] 1 0 40.50 0.00 0.00 0.00
INPUT RF[25] 1 0 40.50 0.00 0.00 0.00
INPUT RF[26] 1 0 40.50 0.00 0.00 0.00
INPUT RF[27] 1 0 40.50 0.00 0.00 0.00
INPUT RF[28] 1 0 40.50 0.00 0.00 0.00
```

```
INPUT RF[29] 1 0 40.50 0.00 0.00 0.00
INPUT RF[30] 1 0 40.50 0.00 0.00 0.00
INPUT RF[31] 1 0 40.50 0.00 0.00 0.00
INPUT RF[0] 0 1 43.60 0.00 0.00 0.00
INPUT RF[1] 0 1 43.60 0.00 0.00 0.00
INPUT RF[2] 0 1 43.60 0.00 0.00 0.00
INPUT RF[3] 0 1 43.60 0.00 0.00 0.00
INPUT RF[4] 0 1 43.60 0.00 0.00 0.00
INPUT RF[5] 0 1 43.60 0.00 0.00 0.00
INPUT RF[6] 0 1 43.60 0.00 0.00 0.00
INPUT RF[7] 0 1 43.60 0.00 0.00 0.00
INPUT RF[8] 0 1 43.60 0.00 0.00 0.00
INPUT RF[9] 0 1 43.60 0.00 0.00 0.00
INPUT RF[10] 0 1 43.60 0.00 0.00 0.00
INPUT RF[11] 0 1 43.60 0.00 0.00 0.00
INPUT RF[12] 0 1 43.60 0.00 0.00 0.00
INPUT RF[13] 0 1 43.60 0.00 0.00 0.00
INPUT RF[14] 0 1 43.60 0.00 0.00 0.00
INPUT RF[15] 0 1 43.60 0.00 0.00 0.00
INPUT RF[16] 0 1 43.60 0.00 0.00 0.00
INPUT RF[17] 0 1 43.60 0.00 0.00 0.00
INPUT RF[18] 0 1 43.60 0.00 0.00 0.00
INPUT RF[19] 0 1 43.60 0.00 0.00 0.00
INPUT RF[20] 0 1 43.60 0.00 0.00 0.00
INPUT RF[21] 0 1 43.60 0.00 0.00 0.00
INPUT RF[22] 0 1 43.60 0.00 0.00 0.00
INPUT RF[23] 0 1 43.60 0.00 0.00 0.00
INPUT RF[24] 0 1 43.60 0.00 0.00 0.00
INPUT RF[25] 0 1 43.60 0.00 0.00 0.00
INPUT RF[26] 0 1 43.60 0.00 0.00 0.00
INPUT RF[27] 0 1 43.60 0.00 0.00 0.00
INPUT RF[28] 0 1 43.60 0.00 0.00 0.00
INPUT RF[29] 0 1 43.60 0.00 0.00 0.00
INPUT RF[30] 0 1 43.60 0.00 0.00 0.00
INPUT RF[31] 0 1 43.60 0.00 0.00 0.00
IGNORE_PATH fr0_pad[0]/rout fr0_pad[0]/rf
IGNORE_PATH fr0_pad[1]/rout fr0_pad[1]/rf
IGNORE_PATH fr0_pad[2]/rout fr0_pad[2]/rf
IGNORE_PATH fr0_pad[3]/rout fr0_pad[3]/rf
IGNORE_PATH fr0_pad[4]/rout fr0_pad[4]/rf
IGNORE_PATH fr0_pad[5]/rout fr0_pad[5]/rf
IGNORE_PATH fr0_pad[6]/rout fr0_pad[6]/rf
IGNORE_PATH fr0_pad[7]/rout fr0_pad[7]/rf
IGNORE_PATH fr1_pad[0]/rout fr1_pad[0]/rf
IGNORE_PATH fr1_pad[1]/rout fr1_pad[1]/rf
IGNORE_PATH fr1_pad[2]/rout fr1_pad[2]/rf
IGNORE_PATH fr1_pad[3]/rout fr1_pad[3]/rf
IGNORE_PATH fr1_pad[4]/rout fr1_pad[4]/rf
IGNORE_PATH fr1_pad[5]/rout fr1_pad[5]/rf
IGNORE_PATH fr1_pad[6]/rout fr1_pad[6]/rf
IGNORE_PATH fr1_pad[7]/rout fr1_pad[7]/rf
IGNORE_PATH fr2_pad[0]/rout fr2_pad[0]/rf
IGNORE_PATH fr2_pad[1]/rout fr2_pad[1]/rf
IGNORE_PATH fr2_pad[2]/rout fr2_pad[2]/rf
```

```
IGNORE_PATH fr2_pad[3]/rout fr2_pad[3]/rf
IGNORE_PATH fr2_pad[4]/rout fr2_pad[4]/rf
IGNORE_PATH fr2_pad[5]/rout fr2_pad[5]/rf
IGNORE_PATH fr2_pad[6]/rout fr2_pad[6]/rf
IGNORE_PATH fr2_pad[7]/rout fr2_pad[7]/rf
IGNORE_PATH fr3_pad[0]/rout fr3_pad[0]/rf
IGNORE_PATH fr3_pad[1]/rout fr3_pad[1]/rf
IGNORE_PATH fr3_pad[2]/rout fr3_pad[2]/rf
IGNORE_PATH fr0_pad[0]/r_out_dis fr0_pad[0]/rf
IGNORE_PATH fr0_pad[1]/r_out_dis fr0_pad[1]/rf
IGNORE_PATH fr0_pad[2]/r_out_dis fr0_pad[2]/rf
IGNORE_PATH fr0_pad[3]/r_out_dis fr0_pad[3]/rf
IGNORE_PATH fr0_pad[4]/r_out_dis fr0_pad[4]/rf
IGNORE_PATH fr0_pad[5]/r_out_dis fr0_pad[5]/rf
IGNORE_PATH fr0_pad[6]/r_out_dis fr0_pad[6]/rf
IGNORE_PATH fr0_pad[7]/r_out_dis fr0_pad[7]/rf
IGNORE_PATH fr1_pad[0]/r_out_dis fr1_pad[0]/rf
IGNORE_PATH fr1_pad[1]/r_out_dis fr1_pad[1]/rf
IGNORE_PATH fr1_pad[2]/r_out_dis fr1_pad[2]/rf
IGNORE_PATH fr1_pad[3]/r_out_dis fr1_pad[3]/rf
IGNORE_PATH fr1_pad[4]/r_out_dis fr1_pad[4]/rf
IGNORE_PATH fr1_pad[5]/r_out_dis fr1_pad[5]/rf
IGNORE_PATH fr1_pad[6]/r_out_dis fr1_pad[6]/rf
IGNORE_PATH fr1_pad[7]/r_out_dis fr1_pad[7]/rf
IGNORE_PATH fr2_pad[0]/r_out_dis fr2_pad[0]/rf
IGNORE_PATH fr2_pad[1]/r_out_dis fr2_pad[1]/rf
IGNORE_PATH fr2_pad[2]/r_out_dis fr2_pad[2]/rf
IGNORE_PATH fr2_pad[3]/r_out_dis fr2_pad[3]/rf
IGNORE_PATH fr2_pad[4]/r_out_dis fr2_pad[4]/rf
IGNORE_PATH fr2_pad[5]/r_out_dis fr2_pad[5]/rf
IGNORE_PATH fr2_pad[6]/r_out_dis fr2_pad[6]/rf
IGNORE_PATH fr2_pad[7]/r_out_dis fr2_pad[7]/rf
IGNORE_PATH fr3_pad[0]/r_out_dis fr3_pad[0]/rf
IGNORE_PATH fr3_pad[1]/r_out_dis fr3_pad[1]/rf
IGNORE_PATH fr3_pad[2]/r_out_dis fr3_pad[2]/rf
IGNORE_PATH inst0_pad[0]/inst_dout inst0_pad[0]/inst
IGNORE_PATH inst0_pad[1]/inst_dout inst0_pad[1]/inst
IGNORE_PATH inst0_pad[2]/inst_dout inst0_pad[2]/inst
IGNORE_PATH inst0_pad[3]/inst_dout inst0_pad[3]/inst
IGNORE_PATH inst0_pad[4]/inst_dout inst0_pad[4]/inst
IGNORE_PATH inst0_pad[5]/inst_dout inst0_pad[5]/inst
IGNORE_PATH inst0_pad[6]/inst_dout inst0_pad[6]/inst
IGNORE_PATH inst0_pad[7]/inst_dout inst0_pad[7]/inst
IGNORE_PATH inst1_pad[0]/inst_dout inst1_pad[0]/inst
IGNORE_PATH inst1_pad[1]/inst_dout inst1_pad[1]/inst
IGNORE_PATH inst1_pad[2]/inst_dout inst1_pad[2]/inst
IGNORE_PATH inst1_pad[3]/inst_dout inst1_pad[3]/inst
IGNORE_PATH inst1_pad[4]/inst_dout inst1_pad[4]/inst
IGNORE_PATH inst1_pad[5]/inst_dout inst1_pad[5]/inst
IGNORE_PATH inst1_pad[6]/inst_dout inst1_pad[6]/inst
IGNORE_PATH inst1_pad[7]/inst_dout inst1_pad[7]/inst
IGNORE_PATH inst2_pad[0]/inst_dout inst2_pad[0]/inst
IGNORE_PATH inst2_pad[1]/inst_dout inst2_pad[1]/inst
IGNORE_PATH inst2_pad[2]/inst_dout inst2_pad[2]/inst
```

```
IGNORE_PATH inst2_pad[3]/inst_dout inst2_pad[3]/inst
IGNORE_PATH inst2_pad[4]/inst_dout inst2_pad[4]/inst
IGNORE_PATH inst2_pad[5]/inst_dout inst2_pad[5]/inst
IGNORE_PATH inst2_pad[6]/inst_dout inst2_pad[6]/inst
IGNORE_PATH inst2_pad[7]/inst_dout inst2_pad[7]/inst
IGNORE_PATH inst3_pad[0]/inst_dout inst3_pad[0]/inst
IGNORE_PATH inst3_pad[1]/inst_dout inst3_pad[1]/inst
IGNORE_PATH inst3_pad[2]/inst_dout inst3_pad[2]/inst
IGNORE_PATH inst3_pad[3]/inst_dout inst3_pad[3]/inst
IGNORE_PATH inst3_pad[4]/inst_dout inst3_pad[4]/inst
IGNORE_PATH inst3_pad[5]/inst_dout inst3_pad[5]/inst
IGNORE_PATH inst3_pad[6]/inst_dout inst3_pad[6]/inst
IGNORE_PATH inst3_pad[7]/inst_dout inst3_pad[7]/inst
IGNORE_PATH inst4_pad[0]/inst_dout inst4_pad[0]/inst
IGNORE_PATH inst4_pad[1]/inst_dout inst4_pad[1]/inst
IGNORE_PATH inst4_pad[2]/inst_dout inst4_pad[2]/inst
IGNORE_PATH inst4_pad[3]/inst_dout inst4_pad[3]/inst
IGNORE_PATH inst4_pad[4]/inst_dout inst4_pad[4]/inst
IGNORE_PATH inst4_pad[5]/inst_dout inst4_pad[5]/inst
IGNORE_PATH inst4_pad[6]/inst_dout inst4_pad[6]/inst
IGNORE_PATH inst4_pad[7]/inst_dout inst4_pad[7]/inst
IGNORE_PATH inst5_pad[0]/inst_dout inst5_pad[0]/inst
IGNORE_PATH inst5_pad[1]/inst_dout inst5_pad[1]/inst
IGNORE_PATH inst5_pad[2]/inst_dout inst5_pad[2]/inst
IGNORE_PATH inst5_pad[3]/inst_dout inst5_pad[3]/inst
IGNORE_PATH inst5_pad[4]/inst_dout inst5_pad[4]/inst
IGNORE_PATH inst5_pad[5]/inst_dout inst5_pad[5]/inst
IGNORE_PATH dr_pad/dr_out_dis dr_pad/dr
IGNORE_PATH fr0_pad[0]/rf pc_gen_mod/bpp_dp/f_r_1[0]
IGNORE_PATH fr0_pad[1]/rf pc_gen_mod/bpp_dp/f_r_1[1]
IGNORE_PATH fr0_pad[2]/rf pc_gen_mod/bpp_dp/f_r_1[2]
IGNORE_PATH fr0_pad[3]/rf pc_gen_mod/bpp_dp/f_r_1[3]
IGNORE_PATH fr0_pad[4]/rf pc_gen_mod/bpp_dp/f_r_1[4]
IGNORE_PATH fr0_pad[5]/rf pc_gen_mod/bpp_dp/f_r_1[5]
IGNORE_PATH fr0_pad[6]/rf pc_gen_mod/bpp_dp/f_r_1[6]
IGNORE_PATH fr0_pad[7]/rf pc_gen_mod/bpp_dp/f_r_1[7]
IGNORE_PATH fr1_pad[0]/rf pc_gen_mod/bpp_dp/f_r_1[8]
IGNORE_PATH fr1_pad[1]/rf pc_gen_mod/bpp_dp/f_r_1[9]
IGNORE_PATH fr1_pad[2]/rf pc_gen_mod/bpp_dp/f_r_1[10]
IGNORE_PATH fr1_pad[3]/rf pc_gen_mod/bpp_dp/f_r_1[11]
IGNORE_PATH fr1_pad[4]/rf pc_gen_mod/bpp_dp/f_r_1[12]
IGNORE_PATH fr1_pad[5]/rf pc_gen_mod/bpp_dp/f_r_1[13]
IGNORE_PATH fr1_pad[6]/rf pc_gen_mod/bpp_dp/f_r_1[14]
IGNORE_PATH fr1_pad[7]/rf pc_gen_mod/bpp_dp/f_r_1[15]
IGNORE_PATH fr2_pad[0]/rf pc_gen_mod/bpp_dp/f_r_1[16]
IGNORE_PATH fr2_pad[1]/rf pc_gen_mod/bpp_dp/f_r_1[17]
IGNORE_PATH fr2_pad[2]/rf pc_gen_mod/bpp_dp/f_r_1[18]
IGNORE_PATH fr2_pad[3]/rf pc_gen_mod/bpp_dp/f_r_1[19]
IGNORE_PATH fr2_pad[4]/rf pc_gen_mod/bpp_dp/f_r_1[20]
IGNORE_PATH fr2_pad[5]/rf pc_gen_mod/bpp_dp/f_r_1[21]
IGNORE_PATH fr2_pad[6]/rf pc_gen_mod/bpp_dp/f_r_1[22]
IGNORE_PATH fr2_pad[7]/rf pc_gen_mod/bpp_dp/f_r_1[23]
IGNORE_PATH fr3_pad[0]/rf pc_gen_mod/bpp_dp/f_r_1[24]
IGNORE_PATH fr3_pad[1]/rf pc_gen_mod/bpp_dp/f_r_1[25]
```

12.2. baseline.040

```
LABEL 75 deg C, 5.0 Volts
TEMP_VOLT 75 5.00
```

12.3. room.040

```
LABEL 67 deg C, 5.0 Volts
TEMP_VOLT 67 5.00
```

12.4. worst.040

```
LABEL 117 deg C, 4.5 Volts
TEMP_VOLT 117 4.50
```

13. Timing Reports

13.1. TYPICAL, 75 deg C, 5.0 V

```
 ********************************************************************************
              Genesil Version v8.0.2 -- Mon Feb  4 10:42:49 1991
Chip: /tmp_mnt/net/yoda/mnta/iag/iag/gt_vic/iag                  Timing Analyzer
********************************************************************************
CLOCK REPORT MODE
--------------------------------------------------------------------------------
Fabline: HP2_CN10B                      Corner: TYPICAL
  Junction Temperature:75 deg C         Voltage:5.00v
  External Clock: Clk
 Included setup files:
  #0  basic                  (Input constraints from other chip>
  #1  baseline               (75 deg C, 5.0 Volts)
--------------------------------------------------------------------------------
                             CLOCK TIMES (minimum)
Phase 1 High:    42.6   ns             Phase 2 High:    46.3   ns
              ----------                              ----------
Cycle (from Ph1):    87.4   ns         Cycle (from Ph2):    90.8   ns
                  ----------                              ----------
Minimum Cycle Time:    90.8   ns       Symmetric Cycle Time:     92.6   ns
                    ----------                              ----------
--------------------------------------------------------------------------------
                             CLOCK WORST CASE PATHS
Minimum Phase 1 high time is    42.6   ns set by:
                             ----------
  ** Clock delay: 1.6ns (44.2-42.6)
   Node                            Cumulative Delay      Transition
   io_mod/sel1/(internal)               44.2                rise
   io_mod/sel1/ods_eq_1_before          43.3                fall
   io_mod/sel1/n_ods_en1                41.9                rise
   io_mod/sel1/ods_en1                  40.8                fall
   io_mod/ds_ctrl/ods_en1               40.8                fall
   io_mod/ds_ctrl/ods_en1'              36.3                fall
```

```
   io_mod/ds_ctrl/flush                36.0                rise
   io_mod/ids_sel/flush                36.0                rise
   io_mod/ids_sel/flush'               35.2                rise
   io_mod/ids_sel/flush_in             34.6                rise
   <_gen_mod/flush_ctrl/flush_out      34.6                rise
   <gen_mod/flush_ctrl/flush_out'      29.5                rise
   <mod/flush_ctrl/GB.LP.NNZ5fN11      29.3                fall
   <mod/flush_ctrl/GB.LP.NNZ5fN21      28.2                rise
   <mod/flush_ctrl/GB.LP.NNZ5fN22      27.7                fall
   <_mod/flush_ctrl/GB.LP.NNZ5fN2      27.0                rise
   <_mod/flush_ctrl/GB.LP.NNZ5fN6      26.1                fall
   <LP.NNalustatZ2eoutZ5fxZ5b2Z5d      25.6                rise
   pc_gen_mod/flush_ctrl/sign          24.5                rise
   sign_pad/sign                       24.5                rise
   sign_pad/sign'                      23.6                rise
   Sign                                21.5                rise

Minimum Phase 2 high time is    46.3   ns set by:
                               ----------
  ** Clock delay: 2.1ns (48.4-46.3)
   Node                              Cumulative Delay      Transition
   <_din_mod/rf_din_dp/(internal)      48.4                fall
   rf_din_mod/rf_din_dp/rf[1]          47.6                rise
   fr0_pad[1]/rf                       47.6                rise
   fr0_pad[1]/rf'                      45.6                rise
   RF[1]                               43.6                rise

Minimum cycle time (from Ph1) is   87.4    ns set by:
                                  ----------
  ** Clock delay: 2.1ns (89.4-87.4)
   Node                              Cumulative Delay      Transition
   <atus_mod/status_dp/(internal)      89.4                fall
   status_mod/status_dp/371            88.9                fall
   <_mod/status_dp/INTER3_ST1[19]      88.6                rise
   <mod/status_dp/intr_status[19]      87.5                rise
   </priority_pla/req_intr_adr[2]      87.5                rise
   <priority_pla/req_intr_adr[2]'      80.9                rise
   <d/priority_pla/GB.LP.NNZ5fN13      80.6                fall
   <d/priority_pla/GB.LP.NNZ5fN11      80.3                rise
   <d/priority_pla/GB.LP.NNZ5fN41      80.1                fall
   <d/priority_pla/GB.LP.NNZ5fN30      79.5                rise
   <d/priority_pla/GB.LP.NNZ5fN32      78.5                rise
   <d/priority_pla/GB.LP.NNZ5fN25      77.5                fall
   <priority_pla/current_intr[14]      77.3                rise
   <_mod/intr_dp/current_intr[14]      77.3                rise
   <mod/intr_dp/current_intr[14]'      77.2                rise
   <_mod/intr_dp/phb_lat_VAL1[14]      76.5                rise
   *intr_mod/intr_dp/(internal)        75.4                fall
   intr_mod/intr_dp/guarded_ei         71.6                fall
   intr_mod/ld_ctrl/guarded_ei         71.6                fall
   intr_mod/ld_ctrl/guarded_ei'        70.9                fall
   intr_mod/ld_ctrl/n_guard            69.8                fall
   io_mod/ids_sel/n_guard_out          69.8                fall
   io_mod/ids_sel/n_guard_out'         67.2                fall
   io_mod/ids_sel/n_guard              66.6                fall
```

io_mod/freeze_ctrl/n_guard	66.6	fall
io_mod/freeze_ctrl/n_guard'	66.3	fall
<od/freeze_ctrl/GB.LP.NNZ5fN14	66.1	rise
<od/freeze_ctrl/GB.LP.NNZ5fN34	65.1	fall
<od/freeze_ctrl/GB.LP.NNZ5fN36	64.7	rise
<od/freeze_ctrl/GB.LP.NNZ5fN31	63.9	fall
io_mod/freeze_ctrl/r_eq_f_1	63.7	rise
reqf1_pad/r_eq_f_1	63.6	rise
reqf1_pad/r_eq_f_1'	60.4	rise
R_eq_f_1	58.3	rise

Minimum cycle time (from Ph2) is 90.8 ns set by:

** Clock delay: 4.2ns (95.0-90.8)

Node	Cumulative Delay	Transition
<_gen_mod/stk_pc_dp/(internal)	95.0	fall
<gen_mod/stk_pc_dp/next_pc[24]	94.8	rise
<_ndp_mod/next_pc_buff/OUT[24]	94.8	rise
<ndp_mod/next_pc_buff/OUT[24]'	90.5	rise
<c_ndp_mod/next_pc_buff/IN[24]	89.8	rise
<ndp_mod/next_pc_adder/OUT[24]	89.8	rise
<dp_mod/next_pc_adder/OUT[24]'	89.7	rise
<ndp_mod/next_pc_adder/IN1[16]	81.8	fall
<od/pc_ndp_mod/pc_buff/OUT[16]	81.8	fall
<d/pc_ndp_mod/pc_buff/OUT[16]'	78.8	fall
<mod/pc_ndp_mod/pc_buff/IN[16]	78.2	fall
<d/pc_ndp_mod/pc_latch/OUT[16]	78.2	fall
</pc_ndp_mod/pc_latch/OUT[16]'	78.0	fall
<od/pc_ndp_mod/pc_latch/IN[16]	76.7	fall
<d/pc_ndp_mod/pc_unlat/OUT[16]	76.7	fall
</pc_ndp_mod/pc_unlat/OUT[16]'	76.6	fall
<od/pc_ndp_mod/pc_unlat/IN[16]	76.4	rise
<pc_ndp_mod/n_pc_unlat/OUT[16]	76.4	rise
<c_ndp_mod/n_pc_unlat/OUT[16]'	76.3	rise
<pc_ndp_mod/n_pc_unlat/IN1[16]	75.9	fall
<_mod/pc_ndp_mod/ready/OUT[16]	75.9	fall
<mod/pc_ndp_mod/ready/OUT[16]'	75.8	fall
<n_mod/pc_ndp_mod/ready/IN[16]	75.6	rise
<od/pc_ndp_mod/n_ready/OUT[16]	75.6	rise
<d/pc_ndp_mod/n_ready/OUT[16]'	75.4	rise
<od/pc_ndp_mod/n_ready/IN1[16]	75.0	fall
<_mod/pc_ndp_mod/alpha/OUT[16]	75.0	fall
<mod/pc_ndp_mod/alpha/OUT[16]'	75.0	fall
<n_mod/pc_ndp_mod/alpha/IN[16]	74.7	rise
<od/pc_ndp_mod/n_alpha/OUT[16]	74.7	rise
<d/pc_ndp_mod/n_alpha/OUT[16]'	74.6	rise
<od/pc_ndp_mod/n_alpha/IN1[16]	74.2	fall
<mod/pc_ndp_mod/br_adr/OUT[16]	74.2	fall
<od/pc_ndp_mod/br_adr/OUT[16]'	71.2	fall
<_mod/pc_ndp_mod/br_adr/IN[16]	71.0	rise
<d/pc_ndp_mod/n_br_adr/OUT[16]	71.0	rise
</pc_ndp_mod/n_br_adr/OUT[16]'	70.9	rise
<d/pc_ndp_mod/n_br_adr/IN2[16]	70.5	fall
<d/pc_ndp_mod/absolute/OUT[16]	70.5	fall

</pc_ndp_mod/absolute/OUT[16]'	70.2	fall
<od/pc_ndp_mod/absolute/IN[16]	70.0	rise
<pc_ndp_mod/n_absolute/OUT[16]	70.0	rise
<c_ndp_mod/n_absolute/OUT[16]'	69.8	rise
<pc_ndp_mod/n_absolute/IN2[16]	69.4	fall
intr_mod/ram/intr_vect[16]	69.4	fall
intr_mod/ram/intr_vect[16]'	69.2	fall
intr_mod/ram/st_vect_adr[2]	63.7	rise
<intr_vect_ctrl/st_vect_adr[2]	63.7	rise
<ntr_vect_ctrl/st_vect_adr[2]'	60.8	rise
</intr_vect_ctrl/GB.LP.NNZ5fN2	60.5	fall
<tr_vect_ctrl/valid_intr_pulse	60.1	rise
<r_mod/valid_intr_ctrl/vip_out	60.1	rise
<_mod/valid_intr_ctrl/vip_out'	55.5	rise
<alid_intr_ctrl/GB.LP.NNZ5fN21	55.3	fall
<alid_intr_ctrl/GB.LP.NNZ5fN11	54.3	rise
<valid_intr_ctrl/GB.LP.NNZ5fN7	53.7	fall
<valid_intr_ctrl/GB.LP.NNZ5fN0	53.4	rise
<valid_intr_ctrl/GB.LP.NNZ5fN6	52.6	fall
<valid_intr_ctrl/GB.LP.NNZ5fN3	52.3	rise
<alid_intr_ctrl/GB.LP.NNZ5fN10	51.1	rise
<P.NNnpassintZ2eoutZ5fxZ5b0Z5d	50.1	fall
*</valid_intr_ctrl/n_pass_intr	48.4	fall
<_mod/pass_intr_dp/n_pass_intr	48.4	fall
<mod/pass_intr_dp/n_pass_intr'	48.2	fall
</pass_intr_dp/req_intr_adr[0]	43.8	rise
</priority_pla/req_intr_adr[0]	43.8	rise
<priority_pla/req_intr_adr[0]'	37.3	rise
<od/priority_pla/GB.LP.NNZ5fN1	37.2	fall
<d/priority_pla/GB.LP.NNZ5fN36	36.8	rise
<d/priority_pla/GB.LP.NNZ5fN47	36.1	fall
<d/priority_pla/GB.LP.NNZ5fN51	35.9	rise
<d/priority_pla/GB.LP.NNZ5fN40	35.1	fall
<d/priority_pla/GB.LP.NNZ5fN12	34.7	rise
<d/priority_pla/GB.LP.NNZ5fN14	33.4	rise
</priority_pla/current_intr[4]	31.6	fall
<r_mod/intr_dp/current_intr[4]	31.6	fall
<_mod/intr_dp/current_intr[4]'	31.5	fall
<r_mod/intr_dp/phb_lat_VAL1[4]	30.7	fall
intr_mod/intr_dp/guarded_ei	26.1	rise
intr_mod/ld_ctrl/guarded_ei	26.1	rise
intr_mod/ld_ctrl/guarded_ei'	25.2	rise
intr_mod/ld_ctrl/n_guard	24.5	rise
io_mod/ids_sel/n_guard_out	24.5	rise
io_mod/ids_sel/n_guard_out'	21.7	rise
io_mod/ids_sel/n_guard	21.1	rise
io_mod/freeze_ctrl/n_guard	21.1	rise
io_mod/freeze_ctrl/n_guard'	20.5	rise
<od/freeze_ctrl/GB.LP.NNZ5fN14	20.3	fall
<od/freeze_ctrl/GB.LP.NNZ5fN34	19.9	rise
<mod/freeze_ctrl/GB.LP.NNZ5fN2	19.4	fall
<mod/freeze_ctrl/GB.LP.NNZ5fN6	19.1	rise
<mod/freeze_ctrl/GB.LP.NNZ5fN9	18.2	rise
io_mod/freeze_ctrl/ids_freeze	17.4	fall

```
   io_mod/test_ctrl/ids_freeze          17.4              fall
   io_mod/test_ctrl/ids_freeze'         16.6              fall
   io_mod/test_ctrl/ids_fr_lat          15.9              fall
   io_mod/test_ctrl/ids_freeze_in       14.4              fall
   io_mod/ds_ctrl/ids_freeze_in         14.4              fall
   io_mod/ds_ctrl/ids_freeze_in'        14.4              fall
   io_mod/ds_ctrl/async_ids_fr          13.4              fall
   <d/async_ids_ctrl/async_ids_fr       13.4              fall
   </async_ids_ctrl/async_ids_fr'       13.2              fall
   <async_ids_ctrl/GB.LP.NNZ5fN27       13.0              rise
   <async_ids_ctrl/GB.LP.NNZ5fN15       11.8              fall
   <async_ids_ctrl/GB.LP.NNZ5fN18       11.5              rise
   <async_ids_ctrl/GB.LP.NNZ5fN28       10.8              fall
   </async_ids_ctrl/GB.LP.NNZ5fN6        9.8              rise
   <async_ids_ctrl/GB.LP.NNZ5fN12        9.3              fall
   io_mod/async_ids_ctrl/ids_sel         9.0              rise
   io_mod/ids_sel/ids_sel                9.0              rise
   io_mod/ids_sel/ids_sel'               7.3              rise
   io_mod/ids_sel/ids_sel_buf            6.7              rise
   io_mod/ids_sel/ids_sel_buf'           6.6              rise
   io_mod/ids_sel/ids_ph_in              5.4              rise
   io_mod/ids_sel/ids_ph_out             5.4              rise
   io_mod/ids_sel/ids_ph_out'            5.3              rise
   io_mod/ids_sel/PHASE_B                4.2              rise
   clk_pad/PHASE_B                       4.2              rise
   Clk                                   0.0              fall
--------------------------------------------------------------------------------
 ********************************************************************************
              Genesil Version v8.0.2 -- Mon Feb  4 10:43:23 1991
Chip: /tmp_mnt/net/yoda/mnta/iag/iag/gt_vic/iag                 Timing Analyzer
********************************************************************************
OUTPUT DELAY MODE
--------------------------------------------------------------------------------
Fabline: HP2_CN10B                      Corner: TYPICAL
  Junction Temperature:75 deg C         Voltage:5.00v
  External Clock: Clk
 Included setup files:
  #0  basic                  (Input constraints from other chip>
  #1  baseline               (75 deg C, 5.0 Volts)
--------------------------------------------------------------------------------
                                OUTPUT DELAYS (ns)
Output                    Ph1(r) Delay      Ph2(r) Delay      Loading(pf)
                          Min      Max      Min      Max
ALU_opcode[0]             13.0     14.6     ---      ---      50.00   PATH
ALU_opcode[1]             13.0     14.6     ---      ---      50.00   PATH
ALU_opcode[2]             12.8     14.5     ---      ---      50.00   PATH
ALU_opcode[3]             12.8     14.4     ---      ---      50.00   PATH
ALU_opcode[4]             12.8     14.5     ---      ---      50.00   PATH
ALU_opcode[5]             12.8     14.4     ---      ---      50.00   PATH
ALU_opcode[6]             12.8     14.5     ---      ---      50.00   PATH
ALU_opcode[7]             12.8     14.5     ---      ---      50.00   PATH
Booting                   13.1     14.8     ---      ---      50.00   PATH
DAG_R_en                  15.5     57.8     17.6     26.8     50.00   PATH
Dr                        20.5     60.4     25.2     27.6     50.00   PATH
```

Flush	13.5	36.4	---	---	50.00	PATH
Freeze	16.4	45.3	17.5	27.9	50.00	PATH
Guard	16.9	74.7	17.8	30.9	50.00	PATH
Ids_eq_ods_1	18.2	20.3	---	---	50.00	PATH
Ids_eq_ods_2	18.7	21.0	---	---	50.00	PATH
Ids_freeze	13.5	16.9	11.5	23.0	50.00	PATH
Ids_sel	12.1	15.8	13.2	13.2	50.00	PATH
Inst[0]	---	---	11.4	14.5	50.00	PATH
Inst[10]	---	---	11.9	14.4	50.00	PATH
Inst[11]	---	---	11.9	14.4	50.00	PATH
Inst[12]	---	---	11.9	14.4	50.00	PATH
Inst[13]	---	---	11.8	14.4	50.00	PATH
Inst[14]	---	---	11.8	14.4	50.00	PATH
Inst[15]	---	---	11.7	14.4	50.00	PATH
Inst[16]	---	---	11.8	14.4	50.00	PATH
Inst[17]	---	---	11.8	14.4	50.00	PATH
Inst[18]	---	---	11.8	14.4	50.00	PATH
Inst[19]	---	---	11.8	14.4	50.00	PATH
Inst[1]	---	---	11.5	14.5	50.00	PATH
Inst[20]	---	---	11.8	14.4	50.00	PATH
Inst[21]	---	---	11.9	14.4	50.00	PATH
Inst[22]	---	---	11.9	14.4	50.00	PATH
Inst[23]	---	---	11.9	14.4	50.00	PATH
Inst[24]	---	---	11.7	14.5	50.00	PATH
Inst[25]	---	---	11.6	14.5	50.00	PATH
Inst[26]	---	---	11.8	14.5	50.00	PATH
Inst[27]	---	---	11.9	14.5	50.00	PATH
Inst[28]	---	---	12.0	14.5	50.00	PATH
Inst[29]	---	---	12.0	14.5	50.00	PATH
Inst[2]	---	---	11.6	14.5	50.00	PATH
Inst[30]	---	---	12.1	14.5	50.00	PATH
Inst[31]	---	---	12.1	14.5	50.00	PATH
Inst[32]	---	---	12.0	14.5	50.00	PATH
Inst[33]	---	---	12.1	14.5	50.00	PATH
Inst[34]	---	---	12.1	14.5	50.00	PATH
Inst[35]	---	---	12.1	14.5	50.00	PATH
Inst[36]	---	---	12.2	14.5	50.00	PATH
Inst[37]	---	---	12.2	14.5	50.00	PATH
Inst[38]	---	---	12.3	14.5	50.00	PATH
Inst[39]	---	---	12.3	14.5	50.00	PATH
Inst[3]	---	---	11.6	14.5	50.00	PATH
Inst[40]	---	---	12.3	15.7	50.00	PATH
Inst[41]	---	---	12.5	15.7	50.00	PATH
Inst[42]	---	---	12.0	15.7	50.00	PATH
Inst[43]	---	---	12.0	15.7	50.00	PATH
Inst[44]	---	---	11.7	15.7	50.00	PATH
Inst[45]	---	---	11.7	15.7	50.00	PATH
Inst[4]	---	---	12.2	14.5	50.00	PATH
Inst[5]	---	---	12.2	14.5	50.00	PATH
Inst[6]	---	---	12.1	14.5	50.00	PATH
Inst[7]	---	---	12.0	14.5	50.00	PATH
Inst[8]	---	---	12.0	14.4	50.00	PATH
Inst[9]	---	---	12.0	14.4	50.00	PATH
Inst_en	---	---	13.0	13.2	50.00	PATH

Inst_rd	13.7	49.3	---	---	50.00	PATH
Ios	12.3	13.7	---	---	50.00	PATH
Kernel_mode	21.1	26.3	---	---	50.00	PATH
N_cs_pha	13.9	13.9	8.9	13.5	50.00	PATH
N_cs_phb	13.1	13.1	10.9	13.9	50.00	PATH
N_inst_wr	12.6	12.6	8.2	8.2	50.00	PATH
N_read[1]	12.5	16.7	14.7	16.0	50.00	PATH
N_reset_out	15.4	23.3	---	---	50.00	PATH
N_write[1]	11.0	24.8	12.4	18.5	50.00	PATH
Ncs[1]	10.1	15.4	11.8	14.2	50.00	PATH
Ncs[2]	10.6	15.9	12.2	14.6	50.00	PATH
Ncs[3]	10.7	16.0	12.3	14.7	50.00	PATH
Ods_freeze	13.8	40.7	15.9	16.9	50.00	PATH
Ods_ids[0]	15.6	55.2	17.6	21.4	50.00	PATH
Ods_ids[1]	15.5	55.1	17.5	21.3	50.00	PATH
Ods_ids[2]	15.6	55.2	17.7	21.4	50.00	PATH
Ods_ids[3]	15.6	55.2	17.7	21.4	50.00	PATH
Ods_sel	11.5	16.2	15.3	15.3	50.00	PATH
Pc[0]	---	---	9.5	12.2	50.00	PATH
Pc[10]	---	---	9.5	12.2	50.00	PATH
Pc[11]	---	---	9.5	12.2	50.00	PATH
Pc[12]	---	---	9.5	12.2	50.00	PATH
Pc[13]	---	---	9.5	12.2	50.00	PATH
Pc[14]	---	---	9.5	12.2	50.00	PATH
Pc[15]	---	---	9.5	12.2	50.00	PATH
Pc[16]	---	---	9.5	12.2	50.00	PATH
Pc[17]	---	---	9.5	12.2	50.00	PATH
Pc[18]	---	---	9.5	12.2	50.00	PATH
Pc[19]	---	---	9.5	12.2	50.00	PATH
Pc[1]	---	---	9.5	12.2	50.00	PATH
Pc[20]	---	---	9.5	12.2	50.00	PATH
Pc[21]	---	---	9.5	12.2	50.00	PATH
Pc[22]	---	---	9.5	12.2	50.00	PATH
Pc[23]	---	---	9.5	12.2	50.00	PATH
Pc[24]	---	---	9.5	12.2	50.00	PATH
Pc[25]	---	---	9.5	12.2	50.00	PATH
Pc[2]	---	---	9.5	12.2	50.00	PATH
Pc[3]	---	---	9.5	12.2	50.00	PATH
Pc[4]	---	---	9.5	12.2	50.00	PATH
Pc[5]	---	---	9.5	12.2	50.00	PATH
Pc[6]	---	---	9.5	12.2	50.00	PATH
Pc[7]	---	---	9.5	12.2	50.00	PATH
Pc[8]	---	---	9.5	12.2	50.00	PATH
Pc[9]	---	---	9.5	12.2	50.00	PATH
RF[0]	14.8	78.1	16.3	25.8	50.00	PATH
RF[10]	14.1	77.7	16.9	30.6	50.00	PATH
RF[11]	14.0	77.6	16.9	26.7	50.00	PATH
RF[12]	14.0	77.6	16.9	25.6	50.00	PATH
RF[13]	13.9	77.6	16.9	25.7	50.00	PATH
RF[14]	13.8	77.5	16.9	26.8	50.00	PATH
RF[15]	14.0	77.6	16.9	25.6	50.00	PATH
RF[16]	14.1	87.0	15.4	41.8	50.00	PATH
RF[17]	14.1	77.7	15.4	27.7	50.00	PATH
RF[18]	13.8	77.5	15.4	29.3	50.00	PATH

RF[19]	13.9	77.6	15.4	27.9	50.00	PATH
RF[1]	14.7	78.1	16.3	25.8	50.00	PATH
RF[20]	14.4	78.0	15.4	25.6	50.00	PATH
RF[21]	14.0	77.7	15.4	25.3	50.00	PATH
RF[22]	13.8	77.6	15.4	40.5	50.00	PATH
RF[23]	13.6	77.4	15.4	25.1	50.00	PATH
RF[24]	13.3	77.2	16.2	24.9	50.00	PATH
RF[25]	13.5	77.4	16.2	26.9	50.00	PATH
RF[26]	13.1	55.9	16.2	24.9	50.00	PATH
RF[27]	13.1	55.9	16.2	24.9	50.00	PATH
RF[28]	12.8	55.9	16.2	24.9	50.00	PATH
RF[29]	12.8	55.9	16.2	24.9	50.00	PATH
RF[2]	14.7	78.0	16.3	25.7	50.00	PATH
RF[30]	12.7	55.9	16.2	24.9	50.00	PATH
RF[31]	12.6	55.9	16.2	24.9	50.00	PATH
RF[3]	14.6	78.0	16.3	25.7	50.00	PATH
RF[4]	14.5	78.0	16.3	25.6	50.00	PATH
RF[5]	14.5	77.9	16.3	25.6	50.00	PATH
RF[6]	14.4	77.9	16.3	25.6	50.00	PATH
RF[7]	14.4	77.9	16.3	25.6	50.00	PATH
RF[8]	14.2	77.8	16.9	30.4	50.00	PATH
RF[9]	14.3	77.8	16.9	28.2	50.00	PATH
Read[2]	18.2	21.7	17.8	20.9	50.00	PATH
Read[3]	20.5	24.1	19.9	23.2	50.00	PATH
Valid_intr_pulse	17.1	30.1	---	---	50.00	PATH
Write[2]	11.3	24.5	14.1	14.8	50.00	PATH
Write[3]	11.3	24.5	14.1	14.8	50.00	PATH

****

Genesil Version v8.0.2 -- Mon Feb 4 11:14:00 1991

Chip: /tmp_mnt/net/yoda/mnta/iag/iag/gt_vic/iag Timing Analyzer

****

SETUP AND HOLD MODE

Fabline: HP2_CN10B Corner: TYPICAL

Junction Temperature:75 deg C Voltage:5.00v

External Clock: Clk

Included setup files:

#0 basic (Input constraints from other chip>

#1 baseline (75 deg C, 5.0 Volts)

INPUT SETUP AND HOLD TIMES (ns)

Input	Setup Time		Hold Time		
	Ph1(f)	Ph2(f)	Ph1(f)	Ph2(f)	
ALU_Flag	22.2	3.4	0.1	-2.4	PATH
Carry	21.8	3.4	0.1	-2.4	PATH
DAG_error	---	5.7	---	-2.9	PATH
DAV[1]	---	39.8	---	-7.0	PATH
DAV[2]	---	40.2	---	-7.1	PATH
DAV[3]	---	40.4	---	-7.4	PATH
Dr	19.9	41.8	-2.2	-1.6	PATH
IAG_test[0]	---	37.2	---	-0.3	PATH
IAG_test[1]	---	37.2	---	-0.4	PATH
Inst[0]	---	4.0	---	-2.5	PATH
Inst[10]	---	4.7	---	-2.9	PATH

Inst[11]	---	4.5	---	-2.9	PATH
Inst[12]	---	3.6	---	-2.3	PATH
Inst[13]	---	3.5	---	-2.3	PATH
Inst[14]	---	3.3	---	-2.1	PATH
Inst[15]	---	3.3	---	-2.0	PATH
Inst[16]	---	3.3	---	-2.1	PATH
Inst[17]	---	3.3	---	-2.1	PATH
Inst[18]	---	3.4	---	-2.1	PATH
Inst[19]	---	3.4	---	-2.2	PATH
Inst[1]	---	4.2	---	-2.6	PATH
Inst[20]	---	3.4	---	-2.2	PATH
Inst[21]	---	3.5	---	-2.2	PATH
Inst[22]	---	3.4	---	-2.2	PATH
Inst[23]	---	3.3	---	-2.0	PATH
Inst[24]	---	3.2	---	-1.9	PATH
Inst[25]	---	3.2	---	-1.9	PATH
Inst[26]	---	4.5	---	-2.5	PATH
Inst[27]	---	4.9	---	-2.7	PATH
Inst[28]	---	5.3	---	-2.9	PATH
Inst[29]	---	4.7	---	-2.9	PATH
Inst[2]	---	4.6	---	-3.1	PATH
Inst[30]	---	3.1	---	-1.9	PATH
Inst[31]	---	3.4	---	-2.2	PATH
Inst[32]	---	3.1	---	-1.9	PATH
Inst[33]	---	3.1	---	-1.9	PATH
Inst[34]	---	3.1	---	-1.9	PATH
Inst[35]	---	3.1	---	-1.9	PATH
Inst[36]	---	3.1	---	-1.9	PATH
Inst[37]	---	3.8	---	-2.7	PATH
Inst[38]	---	4.7	---	-2.6	PATH
Inst[39]	---	4.8	---	-2.7	PATH
Inst[3]	---	4.8	---	-3.2	PATH
Inst[40]	---	4.9	---	-2.8	PATH
Inst[41]	---	4.8	---	-2.7	PATH
Inst[42]	---	5.5	---	-3.5	PATH
Inst[43]	---	5.4	---	-3.5	PATH
Inst[44]	---	5.3	---	-3.3	PATH
Inst[45]	---	5.3	---	-3.3	PATH
Inst[4]	---	5.0	---	-3.1	PATH
Inst[5]	---	4.4	---	-3.1	PATH
Inst[6]	---	5.1	---	-3.1	PATH
Inst[7]	---	4.4	---	-3.0	PATH
Inst[8]	---	4.6	---	-3.0	PATH
Inst[9]	---	4.5	---	-2.9	PATH
Inst_rdy	---	13.5	---	-0.4	PATH
Intr[0]	---	5.8	---	-4.2	PATH
Intr[1]	---	5.8	---	-4.3	PATH
Intr[2]	---	5.8	---	-4.3	PATH
Intr[3]	---	5.8	---	-4.3	PATH
Intr[4]	---	5.8	---	-4.3	PATH
Intr[5]	---	5.9	---	-4.4	PATH
Intr[6]	---	5.9	---	-4.4	PATH
Intr[7]	---	5.9	---	-4.4	PATH
Intr[8]	---	5.4	---	-3.8	PATH

N_reset	-1.4	---	2.7	---	PATH
Pixel_clk	20.9	43.3	-10.1	-1.1	PATH
RFI[1]	19.5	---	-0.9	---	PATH
RFI[2]	19.4	---	-1.0	---	PATH
RFI[3]	19.5	---	-0.8	---	PATH
RF[0]	1.1	2.2	-0.4	-0.2	PATH
RF[10]	1.3	2.3	-0.5	-0.4	PATH
RF[11]	1.2	2.3	-0.5	-0.3	PATH
RF[12]	1.2	2.3	-0.5	-0.3	PATH
RF[13]	1.5	2.6	-0.7	-0.6	PATH
RF[14]	1.2	2.3	-0.4	-0.3	PATH
RF[15]	1.2	2.3	-0.5	-0.3	PATH
RF[16]	1.3	2.4	-0.6	-0.4	PATH
RF[17]	1.3	2.4	-0.5	-0.4	PATH
RF[18]	1.1	2.2	-0.4	-0.2	PATH
RF[19]	1.3	2.3	-0.5	-0.4	PATH
RF[1]	2.0	3.1	-1.3	-1.1	PATH
RF[20]	1.1	2.2	-0.3	-0.2	PATH
RF[21]	1.2	2.3	-0.4	-0.3	PATH
RF[22]	1.3	2.3	-0.5	-0.3	PATH
RF[23]	1.4	2.5	-0.6	-0.5	PATH
RF[24]	1.4	2.5	-0.6	-0.5	PATH
RF[25]	1.6	2.6	-0.8	-0.7	PATH
RF[26]	---	0.6	---	0.2	PATH
RF[27]	---	0.6	---	0.2	PATH
RF[28]	---	0.5	---	0.3	PATH
RF[29]	---	0.4	---	0.3	PATH
RF[2]	1.2	2.2	-0.4	-0.3	PATH
RF[30]	---	0.4	---	0.4	PATH
RF[31]	---	0.3	---	0.4	PATH
RF[3]	1.2	2.3	-0.4	-0.3	PATH
RF[4]	1.2	2.3	-0.4	-0.3	PATH
RF[5]	1.9	3.0	-1.2	-1.1	PATH
RF[6]	1.2	2.3	-0.5	-0.3	PATH
RF[7]	1.2	2.3	-0.5	-0.3	PATH
RF[8]	1.3	2.3	-0.5	-0.4	PATH
RF[9]	1.6	2.7	-0.8	-0.7	PATH
R_eq_f_1	---	30.8	---	-3.5	PATH
R_eq_f_2	---	3.7	---	-1.6	PATH
S_eq_f_1	---	3.6	---	-2.6	PATH
S_eq_f_2	---	3.6	---	-2.6	PATH
Sign	22.3	3.3	0.2	-2.3	PATH
Status[0]	15.2	---	-1.9	---	PATH
Status[1]	15.2	---	-1.9	---	PATH
Status[2]	16.2	---	-2.9	---	PATH
Status[3]	15.0	---	-1.5	---	PATH
Status[4]	14.7	---	-1.5	---	PATH
Zero	21.9	3.3	0.2	-2.3	PATH

```
 ********************************************************************************
              Genesil Version v8.0.2 -- Mon Feb  4 11:18:30 1991
Chip: /tmp_mnt/net/yoda/mnta/iag/iag/gt_vic/iag                 Timing Analyzer
********************************************************************************
PATH DELAY MODE
--------------------------------------------------------------------------------
```

```
Fabline: HP2_CN10B                    Corner: TYPICAL
  Junction Temperature:75 deg C       Voltage:5.00v
  External Clock: Clk
 Included setup files:
  #0  basic                  (Input constraints from other chip>
  #1  baseline               (75 deg C, 5.0 Volts)
-------------------------------------------------------------------------------
                                PATH DELAY (ns)
Source Object     Connector          (Ph1) Min      Max
   Dest. Object       Connector      (Ph2)    Min      Max
 ________________ ________________
 clk_pad________ PHASE_A_________        4.8     11.0
    _____________ ________________
    io_mod/sel1_____ ods_en___________       9.6     11.5  PATH
 _____________ ________________
 io_mod/sel1____ ods_en___________       ---      ---
    _____________ ________________
    *CURRENT*_______ Ncs[1]___________       ---      ---  PATH
 _____________ ________________
 clk_pad________ PHASE_A_________        4.4      4.9
    _____________ ________________
    io_mod/sel1_____ ods_inst[3]_____       ---      ---  PATH
 _____________ ________________
 io_mod/sel1____ ods_inst[3]_____       ---      ---
    _____________ ________________
    *CURRENT*_______ Ncs[1]___________       ---      ---  PATH
 _____________ ________________
 clk_pad________ PHASE_A_________        4.8     11.0
    _____________ ________________
    io_mod/sel1_____ ods_en___________       9.6     11.5  PATH
 _____________ ________________
 io_mod/sel1____ ods_en___________       8.4      9.3
    _____________ ________________
    *CURRENT*_______ N_write[1]______       ---      ---  PATH
 _____________ ________________
 clk_pad________ PHASE_A_________        4.4      4.9
    _____________ ________________
    io_mod/sel1_____ ods_inst[3]_____       ---      ---  PATH
 _____________ ________________
 io_mod/sel1____ ods_inst[3]_____       ---      ---
    _____________ ________________
    *CURRENT*_______ N_write[1]______       ---      ---  PATH
 _____________ ________________
 io_mod/io_dp___ ods_en___________       8.4      9.8
    _____________ ________________
    *CURRENT*_______ Ods_ids[2]______       8.4      9.8  PATH
 _____________ ________________
 io_mod/io_dp___ ids_sel__________       8.7     10.9
    _____________ ________________
    *CURRENT*_______ Ods_ids[2]______       8.7     10.9  PATH
 _____________ ________________
 io_mod/io_dp___ dff1_VAL1[2]____       9.2     10.6
    _____________ ________________
    *CURRENT*_______ Ods_ids[2]______       9.2     10.6  PATH
```

```
 ********************************************************************************
              Genesil Version v8.0.2 -- Mon Feb  4 11:18:36 1991
Chip: /tmp_mnt/net/yoda/mnta/iag/iag/gt_vic/iag                 Timing Analyzer
********************************************************************************
NODE DELAY MODE
--------------------------------------------------------------------------------
Fabline: HP2_CN10B                      Corner: TYPICAL
  Junction Temperature:75 deg C         Voltage:5.00v
  External Clock: Clk
 Included setup files:
  #0  basic                  (Input constraints from other chip>
  #1  baseline               (75 deg C, 5.0 Volts)
--------------------------------------------------------------------------------
NODE DELAYS (ns)
Object           Connector      Ph1(r) Delay    Ph2(r) Delay
                                 Min    Max      Min    Max
 ---------------- ---------------
 io_mod/io_dp__ ods_en_______    9.3   15.5     11.2   13.1 PATH
 ---------------- ---------------
 io_mod/io_dp__ ids_sel______    6.5   10.2      9.0    9.0 PATH
 ---------------- ---------------
 io_mod/io_dp__ dff1_VAL1[2]_    6.5    6.9      ---    --- PATH
 ---------------- ----------------
>---------------- ----------------
 ********************************************************************************
              Genesil Version v8.0.2 -- Mon Feb  4 11:18:50 1991
Chip: /tmp_mnt/net/yoda/mnta/iag/iag/gt_vic/iag                 Timing Analyzer
********************************************************************************
VIOLATION MODE
--------------------------------------------------------------------------------
Fabline: HP2_CN10B                      Corner: TYPICAL
  Junction Temperature:75 deg C         Voltage:5.00v
  External Clock: Clk
 Included setup files:
  #0  basic                  (Input constraints from other chip>
  #1  baseline               (75 deg C, 5.0 Volts)
--------------------------------------------------------------------------------
                                NO VIOLATIONS
  Hold time check margin: 2.0ns
```

13.2. GUARANTEED, Room T, 5.0V

```
 ********************************************************************************
              Genesil Version v8.0.2 -- Mon Feb  4 11:37:55 1991
Chip: /tmp_mnt/net/yoda/mnta/iag/iag/gt_vic/iag                 Timing Analyzer
********************************************************************************
VIOLATION MODE
--------------------------------------------------------------------------------
Fabline: HP2_CN10B                      Corner: TYPICAL
```

```
  Junction Temperature:67 deg C         Voltage:5.00v
  External Clock: Clk
 Included setup files:
  #0  basic                   (Input constraints from other chip>
  #1  room                    (67 deg C, 5.0 Volts)
--------------------------------------------------------------------------------
                                NO VIOLATIONS
  Hold time check margin: 2.0ns
 ********************************************************************************
              Genesil Version v8.0.2 -- Mon Feb  4 12:08:59 1991
Chip: /tmp_mnt/net/yoda/mnta/iag/iag/gt_vic/iag                 Timing Analyzer
********************************************************************************
CLOCK REPORT MODE
--------------------------------------------------------------------------------
Fabline: HP2_CN10B                      Corner: GUARANTEED
  Junction Temperature:67 deg C         Voltage:5.00v
  External Clock: Clk
 Included setup files:
  #0  basic                   (Input constraints from other chip>
  #1  room                    (67 deg C, 5.0 Volts)
--------------------------------------------------------------------------------
                            CLOCK TIMES (minimum)
Phase 1 High:    73.9   ns             Phase 2 High:    69.2   ns
              ----------                             ----------
Cycle (from Ph1):   122.5   ns         Cycle (from Ph2):   143.9   ns
                  ----------                             ----------
Minimum Cycle Time:   143.9   ns       Symmetric Cycle Time:    147.8   ns
                    ----------                             ----------
--------------------------------------------------------------------------------
                            CLOCK WORST CASE PATHS
Minimum Phase 1 high time is    73.9   ns set by:
                            ----------
  ** Clock delay: 4.5ns (78.4-73.9)
   Node                              Cumulative Delay      Transition
   <c_ndp_mod/pc_latch/(internal)      78.4                  fall
   <od/pc_ndp_mod/pc_latch/IN[23]      77.4                  rise
   <d/pc_ndp_mod/pc_unlat/OUT[23]      77.4                  rise
   </pc_ndp_mod/pc_unlat/OUT[23]'      77.3                  rise
   <od/pc_ndp_mod/pc_unlat/IN[23]      77.0                  fall
   <pc_ndp_mod/n_pc_unlat/OUT[23]      77.0                  fall
   <c_ndp_mod/n_pc_unlat/OUT[23]'      76.9                  fall
   <pc_ndp_mod/n_pc_unlat/IN1[23]      76.3                  rise
   <_mod/pc_ndp_mod/ready/OUT[23]      76.3                  rise
   <mod/pc_ndp_mod/ready/OUT[23]'      76.2                  rise
   <n_mod/pc_ndp_mod/ready/IN[23]      75.9                  fall
   <od/pc_ndp_mod/n_ready/OUT[23]      75.9                  fall
   <d/pc_ndp_mod/n_ready/OUT[23]'      75.8                  fall
   <od/pc_ndp_mod/n_ready/IN1[23]      75.3                  rise
   <_mod/pc_ndp_mod/alpha/OUT[23]      75.3                  rise
   <mod/pc_ndp_mod/alpha/OUT[23]'      75.2                  rise
   <n_mod/pc_ndp_mod/alpha/IN[23]      74.8                  fall
   <od/pc_ndp_mod/n_alpha/OUT[23]      74.8                  fall
   <d/pc_ndp_mod/n_alpha/OUT[23]'      74.8                  fall
   <od/pc_ndp_mod/n_alpha/IN1[23]      74.2                  rise
```

<mod/pc_ndp_mod/br_adr/OUT[23]	74.2	rise
<od/pc_ndp_mod/br_adr/OUT[23]'	67.3	rise
<_mod/pc_ndp_mod/br_adr/IN[23]	67.0	fall
<d/pc_ndp_mod/n_br_adr/OUT[23]	67.0	fall
</pc_ndp_mod/n_br_adr/OUT[23]'	66.9	fall
<d/pc_ndp_mod/n_br_adr/IN2[23]	66.4	rise
<d/pc_ndp_mod/absolute/OUT[23]	66.4	rise
</pc_ndp_mod/absolute/OUT[23]'	65.8	rise
<od/pc_ndp_mod/absolute/IN[23]	65.5	fall
<pc_ndp_mod/n_absolute/OUT[23]	65.5	fall
<c_ndp_mod/n_absolute/OUT[23]'	65.4	fall
<pc_ndp_mod/n_absolute/IN2[23]	64.9	rise
intr_mod/ram/intr_vect[23]	64.8	rise
intr_mod/ram/intr_vect[23]'	64.2	rise
intr_mod/ram/st_vect_adr[2]	49.5	rise
<intr_vect_ctrl/st_vect_adr[2]	49.4	rise
<ntr_vect_ctrl/st_vect_adr[2]'	44.6	rise
</intr_vect_ctrl/GB.LP.NNZ5fN2	44.2	fall
<tr_vect_ctrl/valid_intr_pulse	43.7	rise
<r_mod/valid_intr_ctrl/vip_out	42.3	rise
<_mod/valid_intr_ctrl/vip_out'	34.7	rise
<alid_intr_ctrl/GB.LP.NNZ5fN21	34.5	fall
<alid_intr_ctrl/GB.LP.NNZ5fN11	33.1	rise
<valid_intr_ctrl/GB.LP.NNZ5fN7	32.1	fall
<valid_intr_ctrl/GB.LP.NNZ5fN0	31.7	rise
<valid_intr_ctrl/GB.LP.NNZ5fN6	30.3	fall
<valid_intr_ctrl/GB.LP.NNZ5fN3	29.9	rise
<od/valid_intr_ctrl/rd_wr_intr	29.1	fall
inst_mod/rd_wr_inst/rd_wr_intr	28.1	fall
<st_mod/rd_wr_inst/rd_wr_intr'	25.2	fall
inst_mod/rd_wr_inst/read_write	24.1	fall
<t_mod/rd_wr_inst/pc_min_op[1]	21.8	rise
<t_mod/inst_in_dp/pc_min_op[1]	21.5	rise
<_mod/inst_in_dp/pc_min_op[1]'	12.4	rise
<st_mod/inst_in_dp/dff_VAL2[1]	11.2	rise
inst_mod/inst_in_dp/PHASE_A	7.7	rise
clk_pad/PHASE_A	6.8	rise
Clk	0.0	rise

Minimum Phase 2 high time is 69.2 ns set by:

** Clock delay: 4.4ns (73.7-69.2)

Node	Cumulative Delay	Transition
<atus_mod/status_dp/(internal)	73.7	fall
<_mod/status_dp/INTER3_ST1[20]	72.4	rise
<mod/status_dp/intr_status[20]	70.6	rise
</priority_pla/req_intr_adr[3]	70.2	rise
<priority_pla/req_intr_adr[3]'	59.6	rise
<d/priority_pla/GB.LP.NNZ5fN36	58.6	rise
<d/priority_pla/GB.LP.NNZ5fN47	57.6	fall
<d/priority_pla/GB.LP.NNZ5fN51	57.3	rise
<d/priority_pla/GB.LP.NNZ5fN40	56.0	fall
<d/priority_pla/GB.LP.NNZ5fN12	55.5	rise
<d/priority_pla/GB.LP.NNZ5fN14	53.4	rise

</priority_pla/current_intr[4]	50.6	fall
<r_mod/intr_dp/current_intr[4]	50.6	fall
<_mod/intr_dp/current_intr[4]'	50.5	fall
<r_mod/intr_dp/phb_lat_VAL1[4]	49.3	fall
intr_mod/intr_dp/guarded_ei	42.3	rise
intr_mod/ld_ctrl/guarded_ei	42.3	rise
intr_mod/ld_ctrl/guarded_ei'	40.9	rise
intr_mod/ld_ctrl/n_guard	39.9	rise
io_mod/ids_sel/n_guard_out	38.5	rise
io_mod/ids_sel/n_guard_out'	33.9	rise
io_mod/ids_sel/n_guard	33.1	rise
io_mod/freeze_ctrl/n_guard	33.1	rise
io_mod/freeze_ctrl/n_guard'	32.0	rise
<od/freeze_ctrl/GB.LP.NNZ5fN14	31.8	fall
<od/freeze_ctrl/GB.LP.NNZ5fN34	31.1	rise
<mod/freeze_ctrl/GB.LP.NNZ5fN2	30.3	fall
<mod/freeze_ctrl/GB.LP.NNZ5fN6	29.9	rise
<mod/freeze_ctrl/GB.LP.NNZ5fN9	28.5	rise
io_mod/freeze_ctrl/ids_freeze	27.4	fall
io_mod/test_ctrl/ids_freeze	27.3	fall
io_mod/test_ctrl/ids_freeze'	26.0	fall
io_mod/test_ctrl/ids_fr_lat	24.9	fall
io_mod/test_ctrl/ids_fr_lat'	24.9	fall
io_mod/test_ctrl/ids_freeze_in	22.6	fall
io_mod/ds_ctrl/ids_freeze_in	22.6	fall
io_mod/ds_ctrl/ids_freeze_in'	22.6	fall
io_mod/ds_ctrl/async_ids_fr	21.2	fall
<d/async_ids_ctrl/async_ids_fr	21.2	fall
</async_ids_ctrl/async_ids_fr'	20.8	fall
<async_ids_ctrl/GB.LP.NNZ5fN27	20.5	rise
<async_ids_ctrl/GB.LP.NNZ5fN15	18.8	fall
<async_ids_ctrl/GB.LP.NNZ5fN18	18.3	rise
<async_ids_ctrl/GB.LP.NNZ5fN28	17.2	fall
</async_ids_ctrl/GB.LP.NNZ5fN6	15.6	rise
<async_ids_ctrl/GB.LP.NNZ5fN12	14.9	fall
io_mod/async_ids_ctrl/ids_sel	14.4	rise
io_mod/ids_sel/ids_sel	14.3	rise
io_mod/ids_sel/ids_sel'	11.6	rise
io_mod/ids_sel/ids_sel_buf	10.7	rise
io_mod/ids_sel/ids_sel_buf'	10.5	rise
io_mod/ids_sel/ids_ph_in	8.7	rise
io_mod/ids_sel/ids_ph_out	8.7	rise
io_mod/ids_sel/ids_ph_out'	8.6	rise
io_mod/ids_sel/PHASE_B	7.0	rise
clk_pad/PHASE_B	6.4	rise
Clk	0.0	fall

Minimum cycle time (from Ph1) is 122.5 ns set by:

** Clock delay: 4.4ns (126.9-122.5)

Node	Cumulative Delay	Transition
<atus_mod/status_dp/(internal)	126.9	fall
status_mod/status_dp/389	126.0	fall
<_mod/status_dp/INTER3_ST1[20]	125.7	rise

<mod/status_dp/intr_status[20]	123.8	rise
</priority_pla/req_intr_adr[3]	123.5	rise
<priority_pla/req_intr_adr[3]'	112.9	rise
<d/priority_pla/GB.LP.NNZ5fN36	111.8	rise
<d/priority_pla/GB.LP.NNZ5fN47	110.9	fall
<d/priority_pla/GB.LP.NNZ5fN51	110.5	rise
<d/priority_pla/GB.LP.NNZ5fN40	109.3	fall
<d/priority_pla/GB.LP.NNZ5fN12	108.7	rise
<d/priority_pla/GB.LP.NNZ5fN14	106.7	rise
</priority_pla/current_intr[4]	103.9	fall
<r_mod/intr_dp/current_intr[4]	103.8	fall
<_mod/intr_dp/current_intr[4]'	103.8	fall
<r_mod/intr_dp/phb_lat_VAL1[4]	102.5	fall
intr_mod/intr_dp/guarded_ei	95.6	rise
intr_mod/ld_ctrl/guarded_ei	95.6	rise
intr_mod/ld_ctrl/guarded_ei'	94.1	rise
intr_mod/ld_ctrl/n_guard	93.2	rise
io_mod/ids_sel/n_guard_out	91.7	rise
io_mod/ids_sel/n_guard_out'	87.2	rise
io_mod/ids_sel/n_guard	86.3	rise
io_mod/freeze_ctrl/n_guard	86.3	rise
io_mod/freeze_ctrl/n_guard'	85.3	rise
<od/freeze_ctrl/GB.LP.NNZ5fN14	85.0	fall
<od/freeze_ctrl/GB.LP.NNZ5fN34	84.4	rise
<mod/freeze_ctrl/GB.LP.NNZ5fN2	83.6	fall
<mod/freeze_ctrl/GB.LP.NNZ5fN6	83.1	rise
<mod/freeze_ctrl/GB.LP.NNZ5fN9	81.7	rise
io_mod/freeze_ctrl/ids_freeze	80.6	fall
io_mod/test_ctrl/ids_freeze	80.6	fall
io_mod/test_ctrl/ids_freeze'	79.3	fall
io_mod/test_ctrl/ids_fr_lat	78.2	fall
io_mod/test_ctrl/ids_fr_lat'	78.1	fall
io_mod/test_ctrl/ids_freeze_in	75.9	fall
io_mod/ds_ctrl/ids_freeze_in	75.9	fall
io_mod/ds_ctrl/ids_freeze_in'	75.8	fall
io_mod/ds_ctrl/async_ids_fr	74.4	fall
<d/async_ids_ctrl/async_ids_fr	74.4	fall
</async_ids_ctrl/async_ids_fr'	74.1	fall
<async_ids_ctrl/GB.LP.NNZ5fN27	73.8	rise
<async_ids_ctrl/GB.LP.NNZ5fN15	72.0	fall
<async_ids_ctrl/GB.LP.NNZ5fN18	71.6	rise
<async_ids_ctrl/GB.LP.NNZ5fN28	70.4	fall
</async_ids_ctrl/GB.LP.NNZ5fN6	68.9	rise
<async_ids_ctrl/GB.LP.NNZ5fN12	68.1	fall
io_mod/async_ids_ctrl/ids_sel	67.7	rise
io_mod/ids_sel/ids_sel	67.5	rise
io_mod/ids_sel/ids_sel'	64.8	rise
io_mod/ids_sel/ids_sel_buf	63.9	rise
io_mod/ids_sel/ids_sel_buf'	63.7	rise
io_mod/ids_sel/ids_ph_in	62.0	rise
io_mod/ids_sel/ids_ph_out	62.0	rise
io_mod/ids_sel/ids_ph_out'	61.8	rise
*io_mod/ids_sel/(internal)	60.3	fall
io_mod/ids_sel/n_ods_freeze	58.0	rise

io_mod/ids_sel/ods_freeze	57.4	fall
io_mod/test_ctrl/ods_freeze	57.3	fall
io_mod/test_ctrl/ods_freeze'	53.8	fall
io_mod/test_ctrl/ods_fr_lat	52.7	fall
io_mod/test_ctrl/ods_freeze_in	50.4	fall
io_mod/ds_ctrl/ods_freeze_in	50.4	fall
io_mod/ds_ctrl/ods_freeze_in'	49.8	fall
io_mod/ds_ctrl/async_ods_fr	48.4	fall
<d/async_ods_ctrl/async_ods_fr	48.4	fall
</async_ods_ctrl/async_ods_fr'	48.1	fall
<async_ods_ctrl/GB.LP.NNZ5fN30	47.8	rise
</async_ods_ctrl/GB.LP.NNZ5fN1	45.6	fall
<ync_ods_ctrl/valid_intr_pulse	45.1	rise
<_mod/ids_sel/valid_intr_pulse	45.1	rise
<mod/ids_sel/valid_intr_pulse'	44.1	rise
io_mod/ids_sel/vip_in	43.3	rise
<r_mod/valid_intr_ctrl/vip_out	42.3	rise
<_mod/valid_intr_ctrl/vip_out'	34.7	rise
<alid_intr_ctrl/GB.LP.NNZ5fN21	34.5	fall
<alid_intr_ctrl/GB.LP.NNZ5fN11	33.1	rise
<valid_intr_ctrl/GB.LP.NNZ5fN7	32.1	fall
<valid_intr_ctrl/GB.LP.NNZ5fN0	31.7	rise
<valid_intr_ctrl/GB.LP.NNZ5fN6	30.3	fall
<valid_intr_ctrl/GB.LP.NNZ5fN3	29.9	rise
<od/valid_intr_ctrl/rd_wr_intr	29.1	fall
inst_mod/rd_wr_inst/rd_wr_intr	28.1	fall
<st_mod/rd_wr_inst/rd_wr_intr'	25.2	fall
inst_mod/rd_wr_inst/read_write	24.1	fall
<t_mod/rd_wr_inst/pc_min_op[1]	21.8	rise
<t_mod/inst_in_dp/pc_min_op[1]	21.5	rise
<_mod/inst_in_dp/pc_min_op[1]'	12.4	rise
<st_mod/inst_in_dp/dff_VAL2[1]	11.2	rise
inst_mod/inst_in_dp/PHASE_A	7.7	rise
clk_pad/PHASE_A	6.8	rise
Clk	0.0	rise

Minimum cycle time (from Ph2) is 143.9 ns set by:

** Clock delay: 7.5ns (151.4-143.9)

Node	Cumulative Delay	Transition
<_gen_mod/stk_pc_dp/(internal)	151.4	fall
<gen_mod/stk_pc_dp/next_pc[24]	151.1	rise
<_ndp_mod/next_pc_buff/OUT[24]	150.9	rise
<ndp_mod/next_pc_buff/OUT[24]'	143.8	rise
<c_ndp_mod/next_pc_buff/IN[24]	142.8	rise
<ndp_mod/next_pc_adder/OUT[24]	142.8	rise
<dp_mod/next_pc_adder/OUT[24]'	142.7	rise
<_ndp_mod/next_pc_adder/IN1[1]	132.6	rise
<mod/pc_ndp_mod/pc_buff/OUT[1]	132.6	rise
<od/pc_ndp_mod/pc_buff/OUT[1]'	124.2	rise
<_mod/pc_ndp_mod/pc_buff/IN[1]	123.4	rise
<od/pc_ndp_mod/pc_latch/OUT[1]	123.4	rise
<d/pc_ndp_mod/pc_latch/OUT[1]'	123.1	rise
<mod/pc_ndp_mod/pc_latch/IN[1]	121.7	rise

<od/pc_ndp_mod/pc_unlat/OUT[1]	121.7	rise
<d/pc_ndp_mod/pc_unlat/OUT[1]'	121.6	rise
<mod/pc_ndp_mod/pc_unlat/IN[1]	121.3	fall
</pc_ndp_mod/n_pc_unlat/OUT[1]	121.3	fall
<pc_ndp_mod/n_pc_unlat/OUT[1]'	121.3	fall
</pc_ndp_mod/n_pc_unlat/IN1[1]	120.7	rise
<n_mod/pc_ndp_mod/ready/OUT[1]	120.7	rise
<_mod/pc_ndp_mod/ready/OUT[1]'	120.6	rise
<en_mod/pc_ndp_mod/ready/IN[1]	120.3	fall
<mod/pc_ndp_mod/n_ready/OUT[1]	120.3	fall
<od/pc_ndp_mod/n_ready/OUT[1]'	120.2	fall
<mod/pc_ndp_mod/n_ready/IN1[1]	119.7	rise
<n_mod/pc_ndp_mod/alpha/OUT[1]	119.7	rise
<_mod/pc_ndp_mod/alpha/OUT[1]'	119.5	rise
<en_mod/pc_ndp_mod/alpha/IN[1]	119.2	fall
<mod/pc_ndp_mod/n_alpha/OUT[1]	119.2	fall
<od/pc_ndp_mod/n_alpha/OUT[1]'	119.2	fall
<mod/pc_ndp_mod/n_alpha/IN1[1]	118.6	rise
<_mod/pc_ndp_mod/br_adr/OUT[1]	118.6	rise
<mod/pc_ndp_mod/br_adr/OUT[1]'	112.4	rise
<n_mod/pc_ndp_mod/br_adr/IN[1]	112.1	fall
<od/pc_ndp_mod/n_br_adr/OUT[1]	112.1	fall
<d/pc_ndp_mod/n_br_adr/OUT[1]'	112.0	fall
<od/pc_ndp_mod/n_br_adr/IN1[1]	111.4	rise
<_gen_mod/pc_ndp_mod/x1/OUT[1]	111.4	rise
<gen_mod/pc_ndp_mod/x1/OUT[1]'	111.3	rise
pc_gen_mod/pc_ndp_mod/x1/IN[1]	111.0	fall
<en_mod/pc_ndp_mod/n_x1/OUT[1]	111.0	fall
<n_mod/pc_ndp_mod/n_x1/OUT[1]'	110.9	fall
<en_mod/pc_ndp_mod/n_x1/SEL[0]	109.0	rise
pc_gen_mod/flush_ctrl/dis_tp	108.5	rise
pc_gen_mod/flush_ctrl/dis_tp'	105.9	rise
<_mod/flush_ctrl/GB.LP.NNZ5fN5	105.6	fall
<mod/flush_ctrl/GB.LP.NNZ5fN10	104.8	rise
<mod/flush_ctrl/GB.LP.NNZ5fN20	104.2	fall
<mod/flush_ctrl/GB.LP.NNZ5fN12	103.8	rise
pc_gen_mod/flush_ctrl/rs	103.0	fall
task_ptr_mod/task_ptr_ctrl/rs	102.2	fall
task_ptr_mod/task_ptr_ctrl/rs'	101.0	fall
<_ptr_mod/task_ptr_ctrl/rs_out	100.1	fall
task_ptr_mod/tp_en_dec/rs_out	100.1	fall
task_ptr_mod/tp_en_dec/rs_out'	99.0	fall
<r_mod/tp_en_dec/GB.LP.NNZ5fN3	98.6	rise
<n_dec/GB.LP.NNin2Z2eINZ5b0Z5d	98.0	fall
<od/tp_en_dec/valid_intr_pulse	97.5	rise
<r_mod/valid_intr_ctrl/vip_out	95.1	rise
<_mod/valid_intr_ctrl/vip_out'	87.5	rise
<alid_intr_ctrl/GB.LP.NNZ5fN21	87.3	fall
<alid_intr_ctrl/GB.LP.NNZ5fN11	85.9	rise
<valid_intr_ctrl/GB.LP.NNZ5fN7	84.9	fall
<valid_intr_ctrl/GB.LP.NNZ5fN0	84.5	rise
<valid_intr_ctrl/GB.LP.NNZ5fN6	83.1	fall
<valid_intr_ctrl/GB.LP.NNZ5fN3	82.7	rise
<alid_intr_ctrl/GB.LP.NNZ5fN10	81.0	rise

<P.NNnpassintZ2eoutZ5fxZ5b0Z5d	79.5	fall
*</valid_intr_ctrl/n_pass_intr	77.0	fall
<_mod/pass_intr_dp/n_pass_intr	77.0	fall
<mod/pass_intr_dp/n_pass_intr'	76.6	fall
</pass_intr_dp/req_intr_adr[0]	70.0	rise
</priority_pla/req_intr_adr[0]	69.9	rise
<priority_pla/req_intr_adr[0]'	59.4	rise
<od/priority_pla/GB.LP.NNZ5fN1	59.1	fall
<d/priority_pla/GB.LP.NNZ5fN36	58.6	rise
<d/priority_pla/GB.LP.NNZ5fN47	57.6	fall
<d/priority_pla/GB.LP.NNZ5fN51	57.3	rise
<d/priority_pla/GB.LP.NNZ5fN40	56.0	fall
<d/priority_pla/GB.LP.NNZ5fN12	55.5	rise
<d/priority_pla/GB.LP.NNZ5fN14	53.4	rise
</priority_pla/current_intr[4]	50.6	fall
<r_mod/intr_dp/current_intr[4]	50.6	fall
<_mod/intr_dp/current_intr[4]'	50.5	fall
<r_mod/intr_dp/phb_lat_VAL1[4]	49.3	fall
intr_mod/intr_dp/guarded_ei	42.3	rise
intr_mod/ld_ctrl/guarded_ei	42.3	rise
intr_mod/ld_ctrl/guarded_ei'	40.9	rise
intr_mod/ld_ctrl/n_guard	39.9	rise
io_mod/ids_sel/n_guard_out	38.5	rise
io_mod/ids_sel/n_guard_out'	33.9	rise
io_mod/ids_sel/n_guard	33.1	rise
io_mod/freeze_ctrl/n_guard	33.1	rise
io_mod/freeze_ctrl/n_guard'	32.0	rise
<od/freeze_ctrl/GB.LP.NNZ5fN14	31.8	fall
<od/freeze_ctrl/GB.LP.NNZ5fN34	31.1	rise
<mod/freeze_ctrl/GB.LP.NNZ5fN2	30.3	fall
<mod/freeze_ctrl/GB.LP.NNZ5fN6	29.9	rise
<mod/freeze_ctrl/GB.LP.NNZ5fN9	28.5	rise
io_mod/freeze_ctrl/ids_freeze	27.4	fall
io_mod/test_ctrl/ids_freeze	27.3	fall
io_mod/test_ctrl/ids_freeze'	26.0	fall
io_mod/test_ctrl/ids_fr_lat	24.9	fall
io_mod/test_ctrl/ids_fr_lat'	24.9	fall
io_mod/test_ctrl/ids_freeze_in	22.6	fall
io_mod/ds_ctrl/ids_freeze_in	22.6	fall
io_mod/ds_ctrl/ids_freeze_in'	22.6	fall
io_mod/ds_ctrl/async_ids_fr	21.2	fall
<d/async_ids_ctrl/async_ids_fr	21.2	fall
</async_ids_ctrl/async_ids_fr'	20.8	fall
<async_ids_ctrl/GB.LP.NNZ5fN27	20.5	rise
<async_ids_ctrl/GB.LP.NNZ5fN15	18.8	fall
<async_ids_ctrl/GB.LP.NNZ5fN18	18.3	rise
<async_ids_ctrl/GB.LP.NNZ5fN28	17.2	fall
</async_ids_ctrl/GB.LP.NNZ5fN6	15.6	rise
<async_ids_ctrl/GB.LP.NNZ5fN12	14.9	fall
io_mod/async_ids_ctrl/ids_sel	14.4	rise
io_mod/ids_sel/ids_sel	14.3	rise
io_mod/ids_sel/ids_sel'	11.6	rise
io_mod/ids_sel/ids_sel_buf	10.7	rise
io_mod/ids_sel/ids_sel_buf'	10.5	rise

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   io_mod/ids_sel/ids_ph_in            8.7              rise
   io_mod/ids_sel/ids_ph_out           8.7              rise
   io_mod/ids_sel/ids_ph_out'          8.6              rise
   io_mod/ids_sel/PHASE_B              7.0              rise
   clk_pad/PHASE_B                     6.4              rise
   Clk                                 0.0              fall
--------------------------------------------------------------------------------
 ********************************************************************************
              Genesil Version v8.0.2 -- Mon Feb  4 12:09:28 1991
Chip: /tmp_mnt/net/yoda/mnta/iag/iag/gt_vic/iag                 Timing Analyzer
********************************************************************************
OUTPUT DELAY MODE
--------------------------------------------------------------------------------
Fabline: HP2_CN10B                      Corner: GUARANTEED
  Junction Temperature:67 deg C         Voltage:5.00v
  External Clock: Clk
 Included setup files:
  #0  basic                  (Input constraints from other chip>
  #1  room                   (67 deg C, 5.0 Volts)
--------------------------------------------------------------------------------
                              OUTPUT DELAYS (ns)
Output                    Ph1(r) Delay      Ph2(r) Delay      Loading(pf)
                          Min      Max      Min      Max
ALU_opcode[0]             20.0     21.7     ---      ---      50.00   PATH
ALU_opcode[1]             20.1     21.8     ---      ---      50.00   PATH
ALU_opcode[2]             19.6     21.4     ---      ---      50.00   PATH
ALU_opcode[3]             19.7     21.5     ---      ---      50.00   PATH
ALU_opcode[4]             19.8     21.5     ---      ---      50.00   PATH
ALU_opcode[5]             19.7     21.5     ---      ---      50.00   PATH
ALU_opcode[6]             19.8     21.6     ---      ---      50.00   PATH
ALU_opcode[7]             19.8     21.6     ---      ---      50.00   PATH
Booting                   20.7     22.5     ---      ---      50.00   PATH
DAG_R_en                  24.0     79.7     28.1     41.6     50.00   PATH
Dr                        31.8     84.2     39.6     42.8     50.00   PATH
Flush                     19.1     42.4     ---      ---      50.00   PATH
Freeze                    26.0     72.6     27.3     42.9     50.00   PATH
Guard                     28.5     88.2     31.1     49.9     50.00   PATH
Ids_eq_ods_1              27.3     31.4     ---      ---      50.00   PATH
Ids_eq_ods_2              28.2     31.9     ---      ---      50.00   PATH
Ids_freeze                19.8     24.2     17.2     34.2     50.00   PATH
Ids_sel                   17.3     22.5     19.6     19.6     50.00   PATH
Inst[0]                   ---      ---      17.9     22.1     50.00   PATH
Inst[10]                  ---      ---      19.1     21.7     50.00   PATH
Inst[11]                  ---      ---      19.0     21.7     50.00   PATH
Inst[12]                  ---      ---      19.0     21.7     50.00   PATH
Inst[13]                  ---      ---      18.9     21.7     50.00   PATH
Inst[14]                  ---      ---      18.7     21.7     50.00   PATH
Inst[15]                  ---      ---      18.6     21.7     50.00   PATH
Inst[16]                  ---      ---      18.7     21.7     50.00   PATH
Inst[17]                  ---      ---      18.8     21.7     50.00   PATH
Inst[18]                  ---      ---      18.8     21.7     50.00   PATH
Inst[19]                  ---      ---      18.8     21.7     50.00   PATH
Inst[1]                   ---      ---      17.9     22.1     50.00   PATH
Inst[20]                  ---      ---      18.8     21.7     50.00   PATH
```

Inst[21]	---	---	18.9	21.7	50.00	PATH
Inst[22]	---	---	19.0	21.7	50.00	PATH
Inst[23]	---	---	19.1	21.7	50.00	PATH
Inst[24]	---	---	18.3	22.0	50.00	PATH
Inst[25]	---	---	18.2	22.0	50.00	PATH
Inst[26]	---	---	18.9	22.0	50.00	PATH
Inst[27]	---	---	18.9	22.0	50.00	PATH
Inst[28]	---	---	19.0	22.0	50.00	PATH
Inst[29]	---	---	19.0	22.0	50.00	PATH
Inst[2]	---	---	18.1	22.1	50.00	PATH
Inst[30]	---	---	19.3	22.0	50.00	PATH
Inst[31]	---	---	19.3	22.0	50.00	PATH
Inst[32]	---	---	19.2	22.2	50.00	PATH
Inst[33]	---	---	19.2	22.3	50.00	PATH
Inst[34]	---	---	19.3	22.3	50.00	PATH
Inst[35]	---	---	19.3	22.3	50.00	PATH
Inst[36]	---	---	19.4	22.3	50.00	PATH
Inst[37]	---	---	19.5	22.3	50.00	PATH
Inst[38]	---	---	19.8	22.3	50.00	PATH
Inst[39]	---	---	19.9	22.3	50.00	PATH
Inst[3]	---	---	18.1	22.1	50.00	PATH
Inst[40]	---	---	19.7	24.7	50.00	PATH
Inst[41]	---	---	20.3	24.8	50.00	PATH
Inst[42]	---	---	19.2	24.2	50.00	PATH
Inst[43]	---	---	19.1	24.2	50.00	PATH
Inst[44]	---	---	18.4	24.3	50.00	PATH
Inst[45]	---	---	18.3	24.3	50.00	PATH
Inst[4]	---	---	19.7	22.1	50.00	PATH
Inst[5]	---	---	19.6	22.0	50.00	PATH
Inst[6]	---	---	19.4	22.0	50.00	PATH
Inst[7]	---	---	19.3	22.0	50.00	PATH
Inst[8]	---	---	19.2	21.7	50.00	PATH
Inst[9]	---	---	19.2	21.7	50.00	PATH
Inst_en	---	---	19.6	19.8	50.00	PATH
Inst_rd	21.0	72.4	---	---	50.00	PATH
Ios	18.1	19.5	---	---	50.00	PATH
Kernel_mode	33.2	40.9	---	---	50.00	PATH
N_cs_pha	20.2	20.2	13.3	20.2	50.00	PATH
N_cs_phb	19.6	19.6	15.7	20.9	50.00	PATH
N_inst_wr	18.2	18.2	12.4	12.4	50.00	PATH
N_read[1]	18.8	24.1	22.2	23.3	50.00	PATH
N_reset_out	23.1	35.4	---	---	50.00	PATH
N_write[1]	15.8	37.1	18.5	27.6	50.00	PATH
Ncs[1]	14.7	21.8	17.4	20.4	50.00	PATH
Ncs[2]	15.6	22.7	18.1	21.1	50.00	PATH
Ncs[3]	15.9	23.0	18.5	21.4	50.00	PATH
Ods_freeze	20.5	64.2	23.2	24.7	50.00	PATH
Ods_ids[0]	24.0	76.2	27.6	33.6	50.00	PATH
Ods_ids[1]	23.7	75.9	27.3	33.3	50.00	PATH
Ods_ids[2]	23.9	76.2	27.5	33.5	50.00	PATH
Ods_ids[3]	23.9	76.2	27.5	33.5	50.00	PATH
Ods_sel	17.7	24.1	23.1	23.1	50.00	PATH
Pc[0]	---	---	13.7	17.2	50.00	PATH
Pc[10]	---	---	13.4	16.9	50.00	PATH

Pc[11]	---	---	13.4	16.9	50.00	PATH
Pc[12]	---	---	13.3	16.8	50.00	PATH
Pc[13]	---	---	13.3	16.8	50.00	PATH
Pc[14]	---	---	13.5	17.0	50.00	PATH
Pc[15]	---	---	13.6	17.1	50.00	PATH
Pc[16]	---	---	13.6	17.1	50.00	PATH
Pc[17]	---	---	13.7	17.2	50.00	PATH
Pc[18]	---	---	13.7	17.2	50.00	PATH
Pc[19]	---	---	13.7	17.2	50.00	PATH
Pc[1]	---	---	13.7	17.2	50.00	PATH
Pc[20]	---	---	13.8	17.3	50.00	PATH
Pc[21]	---	---	13.9	17.4	50.00	PATH
Pc[22]	---	---	13.9	17.4	50.00	PATH
Pc[23]	---	---	13.9	17.4	50.00	PATH
Pc[24]	---	---	13.9	17.4	50.00	PATH
Pc[25]	---	---	13.9	17.4	50.00	PATH
Pc[2]	---	---	13.7	17.2	50.00	PATH
Pc[3]	---	---	13.7	17.2	50.00	PATH
Pc[4]	---	---	13.7	17.2	50.00	PATH
Pc[5]	---	---	13.7	17.2	50.00	PATH
Pc[6]	---	---	13.7	17.1	50.00	PATH
Pc[7]	---	---	13.6	17.1	50.00	PATH
Pc[8]	---	---	13.6	17.1	50.00	PATH
Pc[9]	---	---	13.6	17.1	50.00	PATH
RF[0]	22.8	109.9	25.5	39.7	50.00	PATH
RF[10]	21.6	109.1	26.9	47.1	50.00	PATH
RF[11]	21.4	109.0	26.9	42.0	50.00	PATH
RF[12]	21.4	108.9	26.9	40.1	50.00	PATH
RF[13]	21.3	108.9	26.9	40.1	50.00	PATH
RF[14]	21.0	108.9	26.9	40.7	50.00	PATH
RF[15]	21.5	109.3	26.9	40.2	50.00	PATH
RF[16]	21.8	109.5	25.0	65.4	50.00	PATH
RF[17]	21.6	109.4	25.0	43.7	50.00	PATH
RF[18]	21.1	109.0	25.0	46.2	50.00	PATH
RF[19]	21.4	109.3	25.0	43.9	50.00	PATH
RF[1]	22.7	109.8	25.5	39.6	50.00	PATH
RF[20]	22.4	110.1	25.0	39.5	50.00	PATH
RF[21]	21.6	109.4	25.0	38.9	50.00	PATH
RF[22]	21.2	109.2	25.0	63.2	50.00	PATH
RF[23]	20.7	108.9	25.1	38.4	50.00	PATH
RF[24]	20.2	108.5	27.1	40.4	50.00	PATH
RF[25]	20.5	108.8	27.1	42.1	50.00	PATH
RF[26]	19.8	78.4	27.1	40.3	50.00	PATH
RF[27]	19.7	78.4	27.1	40.3	50.00	PATH
RF[28]	19.3	78.4	27.0	40.3	50.00	PATH
RF[29]	19.2	78.3	27.0	40.3	50.00	PATH
RF[2]	22.7	109.7	25.5	39.6	50.00	PATH
RF[30]	19.1	78.3	27.0	40.3	50.00	PATH
RF[31]	19.0	78.3	27.0	40.3	50.00	PATH
RF[3]	22.6	109.6	25.6	39.5	50.00	PATH
RF[4]	22.4	109.5	25.6	39.4	50.00	PATH
RF[5]	22.3	109.5	25.6	39.3	50.00	PATH
RF[6]	22.3	109.4	25.6	39.3	50.00	PATH
RF[7]	22.2	109.4	25.6	39.2	50.00	PATH

RF[8]	21.8	109.2	26.8	46.4	50.00	PATH
RF[9]	21.9	109.3	26.8	43.7	50.00	PATH
Read[2]	27.5	32.6	27.7	31.6	50.00	PATH
Read[3]	31.6	36.8	31.4	35.7	50.00	PATH
Valid_intr_pulse	27.4	50.2	---	---	50.00	PATH
Write[2]	17.1	37.6	20.3	21.5	50.00	PATH
Write[3]	17.2	37.6	20.4	21.6	50.00	PATH

****

Genesil Version v8.0.2 -- Mon Feb 4 12:13:42 1991

Chip: /tmp_mnt/net/yoda/mnta/iag/iag/gt_vic/iag Timing Analyzer

****

SETUP AND HOLD MODE

Fabline: HP2_CN10B Corner: GUARANTEED

Junction Temperature:67 deg C Voltage:5.00v

External Clock: Clk

Included setup files:

#0 basic (Input constraints from other chip>

#1 room (67 deg C, 5.0 Volts)

INPUT SETUP AND HOLD TIMES (ns)

Input	Setup Time		Hold Time		
	Ph1(f)	Ph2(f)	Ph1(f)	Ph2(f)	
ALU_Flag	34.5	3.7	0.6	-2.5	PATH
Carry	34.0	3.7	0.6	-2.6	PATH
DAG_error	---	9.7	---	-4.2	PATH
DAV[1]	---	62.3	---	-10.0	PATH
DAV[2]	---	62.9	---	-9.9	PATH
DAV[3]	---	63.2	---	-10.4	PATH
Dr	31.0	65.8	-3.6	-2.6	PATH
IAG_test[0]	---	58.4	---	0.2	PATH
IAG_test[1]	---	58.3	---	0.1	PATH
Inst[0]	---	4.8	---	-2.6	PATH
Inst[10]	---	6.2	---	-3.5	PATH
Inst[11]	---	6.0	---	-3.5	PATH
Inst[12]	---	4.0	---	-2.4	PATH
Inst[13]	---	3.8	---	-2.2	PATH
Inst[14]	---	3.5	---	-1.9	PATH
Inst[15]	---	3.5	---	-1.8	PATH
Inst[16]	---	3.5	---	-1.9	PATH
Inst[17]	---	3.5	---	-1.9	PATH
Inst[18]	---	3.6	---	-2.0	PATH
Inst[19]	---	3.7	---	-2.1	PATH
Inst[1]	---	5.0	---	-2.7	PATH
Inst[20]	---	3.7	---	-2.1	PATH
Inst[21]	---	3.8	---	-2.2	PATH
Inst[22]	---	3.7	---	-2.1	PATH
Inst[23]	---	3.4	---	-1.8	PATH
Inst[24]	---	3.3	---	-1.7	PATH
Inst[25]	---	3.3	---	-1.7	PATH
Inst[26]	---	5.9	---	-2.9	PATH
Inst[27]	---	6.2	---	-3.0	PATH
Inst[28]	---	6.9	---	-3.4	PATH
Inst[29]	---	6.3	---	-3.4	PATH

Inst[2]	---	6.1	---	-3.9	PATH
Inst[30]	---	3.3	---	-1.8	PATH
Inst[31]	---	3.6	---	-2.2	PATH
Inst[32]	---	3.3	---	-1.8	PATH
Inst[33]	---	3.3	---	-1.8	PATH
Inst[34]	---	3.3	---	-1.8	PATH
Inst[35]	---	3.3	---	-1.8	PATH
Inst[36]	---	3.3	---	-1.8	PATH
Inst[37]	---	4.6	---	-3.2	PATH
Inst[38]	---	6.5	---	-2.8	PATH
Inst[39]	---	6.6	---	-3.0	PATH
Inst[3]	---	6.3	---	-3.9	PATH
Inst[40]	---	6.8	---	-3.1	PATH
Inst[41]	---	6.5	---	-3.1	PATH
Inst[42]	---	8.3	---	-4.6	PATH
Inst[43]	---	8.2	---	-4.5	PATH
Inst[44]	---	8.0	---	-4.2	PATH
Inst[45]	---	7.9	---	-4.2	PATH
Inst[4]	---	6.6	---	-3.9	PATH
Inst[5]	---	5.9	---	-3.8	PATH
Inst[6]	---	6.7	---	-3.8	PATH
Inst[7]	---	5.9	---	-3.7	PATH
Inst[8]	---	6.1	---	-3.5	PATH
Inst[9]	---	5.9	---	-3.5	PATH
Inst_rdy	---	21.6	---	0.8	PATH
Intr[0]	---	8.1	---	-6.1	PATH
Intr[1]	---	8.1	---	-6.1	PATH
Intr[2]	---	8.2	---	-6.2	PATH
Intr[3]	---	8.2	---	-6.2	PATH
Intr[4]	---	8.2	---	-6.2	PATH
Intr[5]	---	8.3	---	-6.3	PATH
Intr[6]	---	8.4	---	-6.3	PATH
Intr[7]	---	8.4	---	-6.4	PATH
Intr[8]	---	7.6	---	-5.6	PATH
N_reset	-3.7	---	5.5	---	PATH
Pixel_clk	32.2	67.5	-14.9	-1.4	PATH
RFI[1]	29.4	---	-1.2	---	PATH
RFI[2]	29.3	---	-1.3	---	PATH
RFI[3]	29.3	---	-1.0	---	PATH
RF[0]	1.1	2.2	-0.2	0.5	PATH
RF[10]	1.2	2.3	-0.3	0.3	PATH
RF[11]	1.2	2.3	-0.3	0.4	PATH
RF[12]	1.1	2.2	-0.2	0.4	PATH
RF[13]	1.5	2.6	-0.7	0.0	PATH
RF[14]	1.0	2.1	-0.1	0.6	PATH
RF[15]	1.0	2.1	-0.1	0.6	PATH
RF[16]	1.2	2.2	-0.3	0.4	PATH
RF[17]	1.1	2.2	-0.2	0.4	PATH
RF[18]	0.9	1.9	0.1	0.7	PATH
RF[19]	1.1	2.1	-0.2	0.5	PATH
RF[1]	2.6	3.7	-1.8	-1.1	PATH
RF[20]	0.8	1.9	0.1	0.8	PATH
RF[21]	0.9	2.0	0.0	0.7	PATH
RF[22]	1.1	2.2	-0.2	0.5	PATH

```
RF[23]                    1.3      2.4       -0.5      0.3       PATH
RF[24]                    1.4      2.4       -0.5      0.2       PATH
RF[25]                    1.7      2.8       -0.9     -0.1       PATH
RF[26]                    ---     -0.5        ---      1.4       PATH
RF[27]                    ---     -0.5        ---      1.5       PATH
RF[28]                    ---     -0.8        ---      1.7       PATH
RF[29]                    ---     -0.8        ---      1.8       PATH
RF[2]                     1.2      2.2       -0.2      0.5       PATH
RF[30]                    ---     -0.9        ---      1.8       PATH
RF[31]                    ---     -1.0        ---      1.9       PATH
RF[3]                     1.2      2.2       -0.2      0.5       PATH
RF[4]                     1.2      2.3       -0.2      0.4       PATH
RF[5]                     2.5      3.6       -1.7     -1.0       PATH
RF[6]                     1.2      2.3       -0.3      0.4       PATH
RF[7]                     1.2      2.3       -0.3      0.4       PATH
RF[8]                     1.2      2.3       -0.3      0.4       PATH
RF[9]                     1.7      2.8       -0.9     -0.2       PATH
R_eq_f_1                  ---     50.4        ---     -5.1       PATH
R_eq_f_2                  ---      4.6        ---     -1.7       PATH
S_eq_f_1                  ---      4.2        ---     -3.1       PATH
S_eq_f_2                  ---      4.3        ---     -3.2       PATH
Sign                     34.6      3.6        0.7     -2.4       PATH
Status[0]                22.9      ---       -2.8      ---       PATH
Status[1]                22.8      ---       -2.8      ---       PATH
Status[2]                25.1      ---       -4.9      ---       PATH
Status[3]                22.3      ---       -2.1      ---       PATH
Status[4]                21.8      ---       -2.1      ---       PATH
Zero                     34.1      3.6        0.8     -2.4       PATH
 ******************************************************************************
              Genesil Version v8.0.2 -- Mon Feb  4 12:14:13 1991
Chip: /tmp_mnt/net/yoda/mnta/iag/iag/gt_vic/iag                 Timing Analyzer
******************************************************************************
PATH DELAY MODE
------------------------------------------------------------------------------
Fabline: HP2_CN10B                      Corner: GUARANTEED
  Junction Temperature:67 deg C         Voltage:5.00v
  External Clock: Clk
 Included setup files:
  #0  basic                  (Input constraints from other chip>
  #1  room                   (67 deg C, 5.0 Volts)
------------------------------------------------------------------------------
                                PATH DELAY (ns)
Source Object     Connector           (Ph1) Min      Max
   Dest. Object       Connector       (Ph2)    Min       Max

 _______________ _________________
 clk_pad________ PHASE_A_________         7.7     17.5

    _____________ _________________
    io_mod/sel1_____ ods_en___________       15.1     18.6  PATH

 _______________ _________________
 io_mod/sel1____ ods_en__________         ---      ---

    _____________ _________________
    *CURRENT*_______ Ncs[1]___________        ---      ---  PATH

 _______________ _________________
 clk_pad________ PHASE_A_________         7.2      7.7
```

```
                                                                                
   io_mod/sel1_____ ods_inst[3]_____        ---      ---  PATH
                                                                                
io_mod/sel1____ ods_inst[3]_____          ---      ---
                                                                                
   *CURRENT*_______ Ncs[1]___________       ---      ---  PATH
                                                                                
clk_pad________ PHASE_A_________          7.7     17.5
                                                                                
   io_mod/sel1_____ ods_en__________       15.1     18.6  PATH
                                                                                
io_mod/sel1____ ods_en__________         12.0     12.8
                                                                                
   *CURRENT*_______ N_write[1]_______       ---      ---  PATH
                                                                                
clk_pad________ PHASE_A_________          7.2      7.7
                                                                                
   io_mod/sel1_____ ods_inst[3]_____       ---      ---  PATH
                                                                                
io_mod/sel1____ ods_inst[3]_____          ---      ---
                                                                                
   *CURRENT*_______ N_write[1]_______       ---      ---  PATH
                                                                                
io_mod/io_dp___ ods_en__________         12.5     14.0
                                                                                
   *CURRENT*_______ Ods_ids[2]_______       12.5     14.0  PATH
                                                                                
io_mod/io_dp___ ids_sel_________         13.0     15.7
                                                                                
   *CURRENT*_______ Ods_ids[2]_______       13.0     15.7  PATH
                                                                                
io_mod/io_dp___ dff1_VAL1[2]____         13.7     15.2
                                                                                
   *CURRENT*_______ Ods_ids[2]_______       13.7     15.2  PATH
                                                                                
>                                                                               
                                                                                
                                                                                
 ********************************************************************************
              Genesil Version v8.0.2 -- Mon Feb  4 12:14:17 1991
Chip: /tmp_mnt/net/yoda/mnta/iag/iag/gt_vic/iag                 Timing Analyzer
********************************************************************************
NODE DELAY MODE
--------------------------------------------------------------------------------
Fabline: HP2_CN10B                      Corner: GUARANTEED
  Junction Temperature:67 deg C         Voltage:5.00v
  External Clock: Clk
 Included setup files:
  #0  basic                  (Input constraints from other chip>
  #1  room                   (67 deg C, 5.0 Volts)
--------------------------------------------------------------------------------
NODE DELAYS (ns)
Object          Connector      Ph1(r) Delay    Ph2(r) Delay
                                Min    Max      Min    Max
```

```
 _____________ _____________
 io_mod/io_dp__ ods_en_______   14.5   24.3     17.5   21.0 PATH
 _____________ _____________
 io_mod/io_dp__ ids_sel______   10.7   15.9     14.5   14.5 PATH
 _____________ _____________
 io_mod/io_dp__ dff1_VAL1[2]_   10.2   10.7      ---    --- PATH
 _____________ _____________
>_____________ _____________
 ********************************************************************************
              Genesil Version v8.0.2 -- Mon Feb  4 12:14:29 1991
Chip: /tmp_mnt/net/yoda/mnta/iag/iag/gt_vic/iag                 Timing Analyzer
********************************************************************************
VIOLATION MODE
--------------------------------------------------------------------------------
Fabline: HP2_CN10B                      Corner: GUARANTEED
  Junction Temperature:67 deg C         Voltage:5.00v
  External Clock: Clk
 Included setup files:
  #0  basic                  (Input constraints from other chip>
  #1  room                   (67 deg C, 5.0 Volts)
--------------------------------------------------------------------------------
                                NO VIOLATIONS
  Hold time check margin: 2.0ns
```

13.3. GUARANTEED, Max T, Min V

```
 ********************************************************************************
              Genesil Version v8.0.2 -- Mon Feb  4 12:15:26 1991
Chip: /tmp_mnt/net/yoda/mnta/iag/iag/gt_vic/iag                 Timing Analyzer
********************************************************************************
CLOCK REPORT MODE
--------------------------------------------------------------------------------
Fabline: HP2_CN10B                      Corner: GUARANTEED
  Junction Temperature:117 deg C        Voltage:4.50v
  External Clock: Clk
 Included setup files:
  #0  basic                  (Input constraints from other chip>
  #1  worst                  (117 deg C, 4.5 Volts)
--------------------------------------------------------------------------------
                            CLOCK TIMES (minimum)
Phase 1 High:    91.9   ns          Phase 2 High:    85.8   ns
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Cycle (from Ph1):   152.0   ns     Cycle (from Ph2):   178.5   ns
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Minimum Cycle Time:   178.5   ns   Symmetric Cycle Time:    183.8   ns
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                            CLOCK WORST CASE PATHS
Minimum Phase 1 high time is    91.9   ns set by:
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  ** Clock delay: 5.6ns (97.5-91.9)
   Node                          Cumulative Delay      Transition
   <c_ndp_mod/pc_latch/(internal)      97.5                fall
```

<od/pc_ndp_mod/pc_latch/IN[23]	96.3	rise
<d/pc_ndp_mod/pc_unlat/OUT[23]	96.3	rise
</pc_ndp_mod/pc_unlat/OUT[23]'	96.1	rise
<od/pc_ndp_mod/pc_unlat/IN[23]	95.7	fall
<pc_ndp_mod/n_pc_unlat/OUT[23]	95.7	fall
<c_ndp_mod/n_pc_unlat/OUT[23]'	95.7	fall
<pc_ndp_mod/n_pc_unlat/IN1[23]	95.0	rise
<_mod/pc_ndp_mod/ready/OUT[23]	95.0	rise
<mod/pc_ndp_mod/ready/OUT[23]'	94.8	rise
<n_mod/pc_ndp_mod/ready/IN[23]	94.5	fall
<od/pc_ndp_mod/n_ready/OUT[23]	94.5	fall
<d/pc_ndp_mod/n_ready/OUT[23]'	94.4	fall
<od/pc_ndp_mod/n_ready/IN1[23]	93.7	rise
<_mod/pc_ndp_mod/alpha/OUT[23]	93.7	rise
<mod/pc_ndp_mod/alpha/OUT[23]'	93.5	rise
<n_mod/pc_ndp_mod/alpha/IN[23]	93.2	fall
<od/pc_ndp_mod/n_alpha/OUT[23]	93.2	fall
<d/pc_ndp_mod/n_alpha/OUT[23]'	93.1	fall
<od/pc_ndp_mod/n_alpha/IN1[23]	92.4	rise
<mod/pc_ndp_mod/br_adr/OUT[23]	92.4	rise
<od/pc_ndp_mod/br_adr/OUT[23]'	83.7	rise
<_mod/pc_ndp_mod/br_adr/IN[23]	83.3	fall
<d/pc_ndp_mod/n_br_adr/OUT[23]	83.3	fall
</pc_ndp_mod/n_br_adr/OUT[23]'	83.2	fall
<d/pc_ndp_mod/n_br_adr/IN2[23]	82.5	rise
<d/pc_ndp_mod/absolute/OUT[23]	82.5	rise
</pc_ndp_mod/absolute/OUT[23]'	81.8	rise
<od/pc_ndp_mod/absolute/IN[23]	81.5	fall
<pc_ndp_mod/n_absolute/OUT[23]	81.5	fall
<c_ndp_mod/n_absolute/OUT[23]'	81.4	fall
<pc_ndp_mod/n_absolute/IN2[23]	80.7	rise
intr_mod/ram/intr_vect[23]	80.7	rise
intr_mod/ram/intr_vect[23]'	79.9	rise
intr_mod/ram/st_vect_adr[2]	61.5	rise
<intr_vect_ctrl/st_vect_adr[2]	61.5	rise
<ntr_vect_ctrl/st_vect_adr[2]'	55.5	rise
</intr_vect_ctrl/GB.LP.NNZ5fN2	55.0	fall
<tr_vect_ctrl/valid_intr_pulse	54.4	rise
<r_mod/valid_intr_ctrl/vip_out	52.6	rise
<_mod/valid_intr_ctrl/vip_out'	43.1	rise
<alid_intr_ctrl/GB.LP.NNZ5fN21	42.8	fall
<alid_intr_ctrl/GB.LP.NNZ5fN11	41.1	rise
<valid_intr_ctrl/GB.LP.NNZ5fN7	39.9	fall
<valid_intr_ctrl/GB.LP.NNZ5fN0	39.4	rise
<valid_intr_ctrl/GB.LP.NNZ5fN6	37.7	fall
<valid_intr_ctrl/GB.LP.NNZ5fN3	37.2	rise
<od/valid_intr_ctrl/rd_wr_intr	36.2	fall
inst_mod/rd_wr_inst/rd_wr_intr	35.0	fall
<st_mod/rd_wr_inst/rd_wr_intr'	31.3	fall
inst_mod/rd_wr_inst/read_write	29.9	fall
<t_mod/rd_wr_inst/pc_min_op[1]	27.1	rise
<t_mod/inst_in_dp/pc_min_op[1]	26.7	rise
<_mod/inst_in_dp/pc_min_op[1]'	15.3	rise
<st_mod/inst_in_dp/dff_VAL2[1]	13.9	rise

inst_mod/inst_in_dp/PHASE_A	9.5	rise
clk_pad/PHASE_A	8.5	rise
Clk	0.0	rise

Minimum Phase 2 high time is 85.8 ns set by:

** Clock delay: 5.5ns (91.4-85.8)

Node	Cumulative Delay	Transition
<atus_mod/status_dp/(internal)	91.4	fall
<_mod/status_dp/INTER3_ST1[20]	89.9	rise
<mod/status_dp/intr_status[20]	87.6	rise
</priority_pla/req_intr_adr[3]	87.1	rise
<priority_pla/req_intr_adr[3]'	73.9	rise
<d/priority_pla/GB.LP.NNZ5fN36	72.6	rise
<d/priority_pla/GB.LP.NNZ5fN47	71.4	fall
<d/priority_pla/GB.LP.NNZ5fN51	71.0	rise
<d/priority_pla/GB.LP.NNZ5fN40	69.4	fall
<d/priority_pla/GB.LP.NNZ5fN12	68.7	rise
<d/priority_pla/GB.LP.NNZ5fN14	66.2	rise
</priority_pla/current_intr[4]	62.7	fall
<r_mod/intr_dp/current_intr[4]	62.6	fall
<_mod/intr_dp/current_intr[4]'	62.6	fall
<r_mod/intr_dp/phb_lat_VAL1[4]	61.0	fall
intr_mod/intr_dp/guarded_ei	52.5	rise
intr_mod/ld_ctrl/guarded_ei	52.5	rise
intr_mod/ld_ctrl/guarded_ei'	50.7	rise
intr_mod/ld_ctrl/n_guard	49.5	rise
io_mod/ids_sel/n_guard_out	47.7	rise
io_mod/ids_sel/n_guard_out'	42.0	rise
io_mod/ids_sel/n_guard	41.0	rise
io_mod/freeze_ctrl/n_guard	40.9	rise
io_mod/freeze_ctrl/n_guard'	39.6	rise
<od/freeze_ctrl/GB.LP.NNZ5fN14	39.3	fall
<od/freeze_ctrl/GB.LP.NNZ5fN34	38.6	rise
<mod/freeze_ctrl/GB.LP.NNZ5fN2	37.5	fall
<mod/freeze_ctrl/GB.LP.NNZ5fN6	37.0	rise
<mod/freeze_ctrl/GB.LP.NNZ5fN9	35.3	rise
io_mod/freeze_ctrl/ids_freeze	33.9	fall
io_mod/test_ctrl/ids_freeze	33.8	fall
io_mod/test_ctrl/ids_freeze'	32.2	fall
io_mod/test_ctrl/ids_fr_lat	30.9	fall
io_mod/test_ctrl/ids_fr_lat'	30.8	fall
io_mod/test_ctrl/ids_freeze_in	28.0	fall
io_mod/ds_ctrl/ids_freeze_in	28.0	fall
io_mod/ds_ctrl/ids_freeze_in'	28.0	fall
io_mod/ds_ctrl/async_ids_fr	26.2	fall
<d/async_ids_ctrl/async_ids_fr	26.2	fall
</async_ids_ctrl/async_ids_fr'	25.8	fall
<async_ids_ctrl/GB.LP.NNZ5fN27	25.4	rise
<async_ids_ctrl/GB.LP.NNZ5fN15	23.3	fall
<async_ids_ctrl/GB.LP.NNZ5fN18	22.7	rise
<async_ids_ctrl/GB.LP.NNZ5fN28	21.2	fall
</async_ids_ctrl/GB.LP.NNZ5fN6	19.4	rise
<async_ids_ctrl/GB.LP.NNZ5fN12	18.4	fall

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   io_mod/async_ids_ctrl/ids_sel       17.9              rise
   io_mod/ids_sel/ids_sel              17.7              rise
   io_mod/ids_sel/ids_sel'             14.3              rise
   io_mod/ids_sel/ids_sel_buf          13.3              rise
   io_mod/ids_sel/ids_sel_buf'         13.0              rise
   io_mod/ids_sel/ids_ph_in            10.8              rise
   io_mod/ids_sel/ids_ph_out           10.8              rise
   io_mod/ids_sel/ids_ph_out'          10.7              rise
   io_mod/ids_sel/PHASE_B               8.7              rise
   clk_pad/PHASE_B                      8.0              rise
   Clk                                  0.0              fall


Minimum cycle time (from Ph1) is  152.0    ns set by:
                                 ----------

  ** Clock delay: 5.5ns (157.5-152.0)
   Node                            Cumulative Delay      Transition
   <atus_mod/status_dp/(internal)     157.5                 fall
   status_mod/status_dp/389           156.5                 fall
   <_mod/status_dp/INTER3_ST1[20]     156.0                 rise
   <mod/status_dp/intr_status[20]     153.8                 rise
   </priority_pla/req_intr_adr[3]     153.3                 rise
   <priority_pla/req_intr_adr[3]'     140.1                 rise
   <d/priority_pla/GB.LP.NNZ5fN36     138.8                 rise
   <d/priority_pla/GB.LP.NNZ5fN47     137.6                 fall
   <d/priority_pla/GB.LP.NNZ5fN51     137.1                 rise
   <d/priority_pla/GB.LP.NNZ5fN40     135.6                 fall
   <d/priority_pla/GB.LP.NNZ5fN12     134.9                 rise
   <d/priority_pla/GB.LP.NNZ5fN14     132.4                 rise
   </priority_pla/current_intr[4]     128.8                 fall
   <r_mod/intr_dp/current_intr[4]     128.8                 fall
   <_mod/intr_dp/current_intr[4]'     128.7                 fall
   <r_mod/intr_dp/phb_lat_VAL1[4]     127.2                 fall
   intr_mod/intr_dp/guarded_ei        118.7                 rise
   intr_mod/ld_ctrl/guarded_ei        118.7                 rise
   intr_mod/ld_ctrl/guarded_ei'       116.9                 rise
   intr_mod/ld_ctrl/n_guard           115.7                 rise
   io_mod/ids_sel/n_guard_out         113.9                 rise
   io_mod/ids_sel/n_guard_out'        108.2                 rise
   io_mod/ids_sel/n_guard             107.1                 rise
   io_mod/freeze_ctrl/n_guard         107.1                 rise
   io_mod/freeze_ctrl/n_guard'        105.8                 rise
   <od/freeze_ctrl/GB.LP.NNZ5fN14     105.5                 fall
   <od/freeze_ctrl/GB.LP.NNZ5fN34     104.7                 rise
   <mod/freeze_ctrl/GB.LP.NNZ5fN2     103.7                 fall
   <mod/freeze_ctrl/GB.LP.NNZ5fN6     103.2                 rise
   <mod/freeze_ctrl/GB.LP.NNZ5fN9     101.5                 rise
   io_mod/freeze_ctrl/ids_freeze      100.1                 fall
   io_mod/test_ctrl/ids_freeze        100.0                 fall
   io_mod/test_ctrl/ids_freeze'        98.4                 fall
   io_mod/test_ctrl/ids_fr_lat         97.0                 fall
   io_mod/test_ctrl/ids_fr_lat'        97.0                 fall
   io_mod/test_ctrl/ids_freeze_in      94.2                 fall
   io_mod/ds_ctrl/ids_freeze_in        94.2                 fall
   io_mod/ds_ctrl/ids_freeze_in'       94.1                 fall
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io_mod/ds_ctrl/async_ids_fr	92.4	fall
<d/async_ids_ctrl/async_ids_fr	92.4	fall
</async_ids_ctrl/async_ids_fr'	91.9	fall
<async_ids_ctrl/GB.LP.NNZ5fN27	91.6	rise
<async_ids_ctrl/GB.LP.NNZ5fN15	89.4	fall
<async_ids_ctrl/GB.LP.NNZ5fN18	88.9	rise
<async_ids_ctrl/GB.LP.NNZ5fN28	87.4	fall
</async_ids_ctrl/GB.LP.NNZ5fN6	85.6	rise
<async_ids_ctrl/GB.LP.NNZ5fN12	84.6	fall
io_mod/async_ids_ctrl/ids_sel	84.1	rise
io_mod/ids_sel/ids_sel	83.9	rise
io_mod/ids_sel/ids_sel'	80.5	rise
io_mod/ids_sel/ids_sel_buf	79.4	rise
io_mod/ids_sel/ids_sel_buf'	79.2	rise
io_mod/ids_sel/ids_ph_in	77.0	rise
io_mod/ids_sel/ids_ph_out	77.0	rise
io_mod/ids_sel/ids_ph_out'	76.9	rise
*io_mod/ids_sel/(internal)	75.0	fall
io_mod/ids_sel/n_ods_freeze	72.1	rise
io_mod/ids_sel/ods_freeze	71.3	fall
io_mod/test_ctrl/ods_freeze	71.3	fall
io_mod/test_ctrl/ods_freeze'	66.8	fall
io_mod/test_ctrl/ods_fr_lat	65.5	fall
io_mod/test_ctrl/ods_freeze_in	62.7	fall
io_mod/ds_ctrl/ods_freeze_in	62.7	fall
io_mod/ds_ctrl/ods_freeze_in'	62.0	fall
io_mod/ds_ctrl/async_ods_fr	60.2	fall
<d/async_ods_ctrl/async_ods_fr	60.2	fall
</async_ods_ctrl/async_ods_fr'	59.9	fall
<async_ods_ctrl/GB.LP.NNZ5fN30	59.5	rise
</async_ods_ctrl/GB.LP.NNZ5fN1	56.6	fall
<ync_ods_ctrl/valid_intr_pulse	56.1	rise
<_mod/ids_sel/valid_intr_pulse	56.1	rise
<mod/ids_sel/valid_intr_pulse'	54.9	rise
io_mod/ids_sel/vip_in	53.8	rise
<r_mod/valid_intr_ctrl/vip_out	52.6	rise
<_mod/valid_intr_ctrl/vip_out'	43.1	rise
<alid_intr_ctrl/GB.LP.NNZ5fN21	42.8	fall
<alid_intr_ctrl/GB.LP.NNZ5fN11	41.1	rise
<valid_intr_ctrl/GB.LP.NNZ5fN7	39.9	fall
<valid_intr_ctrl/GB.LP.NNZ5fN0	39.4	rise
<valid_intr_ctrl/GB.LP.NNZ5fN6	37.7	fall
<valid_intr_ctrl/GB.LP.NNZ5fN3	37.2	rise
<od/valid_intr_ctrl/rd_wr_intr	36.2	fall
inst_mod/rd_wr_inst/rd_wr_intr	35.0	fall
<st_mod/rd_wr_inst/rd_wr_intr'	31.3	fall
inst_mod/rd_wr_inst/read_write	29.9	fall
<t_mod/rd_wr_inst/pc_min_op[1]	27.1	rise
<t_mod/inst_in_dp/pc_min_op[1]	26.7	rise
<_mod/inst_in_dp/pc_min_op[1]'	15.3	rise
<st_mod/inst_in_dp/dff_VAL2[1]	13.9	rise
inst_mod/inst_in_dp/PHASE_A	9.5	rise
clk_pad/PHASE_A	8.5	rise
Clk	0.0	rise

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Minimum cycle time (from Ph2) is  178.5    ns set by:
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  ** Clock delay: 9.3ns (187.8-178.5)
   Node                              Cumulative Delay      Transition
   <_gen_mod/stk_pc_dp/(internal)        187.8                fall
   <gen_mod/stk_pc_dp/next_pc[24]        187.4                rise
   <_ndp_mod/next_pc_buff/OUT[24]        187.2                rise
   <ndp_mod/next_pc_buff/OUT[24]'        178.4                rise
   <c_ndp_mod/next_pc_buff/IN[24]        177.0                rise
   <ndp_mod/next_pc_adder/OUT[24]        177.0                rise
   <dp_mod/next_pc_adder/OUT[24]'        176.9                rise
   <_ndp_mod/next_pc_adder/IN1[1]        164.7                rise
   <mod/pc_ndp_mod/pc_buff/OUT[1]        164.7                rise
   <od/pc_ndp_mod/pc_buff/OUT[1]'        154.2                rise
   <_mod/pc_ndp_mod/pc_buff/IN[1]        153.1                rise
   <od/pc_ndp_mod/pc_latch/OUT[1]        153.1                rise
   <d/pc_ndp_mod/pc_latch/OUT[1]'        152.8                rise
   <mod/pc_ndp_mod/pc_latch/IN[1]        151.1                rise
   <od/pc_ndp_mod/pc_unlat/OUT[1]        151.1                rise
   <d/pc_ndp_mod/pc_unlat/OUT[1]'        151.0                rise
   <mod/pc_ndp_mod/pc_unlat/IN[1]        150.6                fall
   </pc_ndp_mod/n_pc_unlat/OUT[1]        150.6                fall
   <pc_ndp_mod/n_pc_unlat/OUT[1]'        150.5                fall
   </pc_ndp_mod/n_pc_unlat/IN1[1]        149.8                rise
   <n_mod/pc_ndp_mod/ready/OUT[1]        149.8                rise
   <_mod/pc_ndp_mod/ready/OUT[1]'        149.7                rise
   <en_mod/pc_ndp_mod/ready/IN[1]        149.3                fall
   <mod/pc_ndp_mod/n_ready/OUT[1]        149.3                fall
   <od/pc_ndp_mod/n_ready/OUT[1]'        149.2                fall
   <mod/pc_ndp_mod/n_ready/IN1[1]        148.5                rise
   <n_mod/pc_ndp_mod/alpha/OUT[1]        148.5                rise
   <_mod/pc_ndp_mod/alpha/OUT[1]'        148.4                rise
   <en_mod/pc_ndp_mod/alpha/IN[1]        148.0                fall
   <mod/pc_ndp_mod/n_alpha/OUT[1]        148.0                fall
   <od/pc_ndp_mod/n_alpha/OUT[1]'        147.9                fall
   <mod/pc_ndp_mod/n_alpha/IN1[1]        147.2                rise
   <_mod/pc_ndp_mod/br_adr/OUT[1]        147.2                rise
   <mod/pc_ndp_mod/br_adr/OUT[1]'        139.4                rise
   <n_mod/pc_ndp_mod/br_adr/IN[1]        139.0                fall
   <od/pc_ndp_mod/n_br_adr/OUT[1]        139.0                fall
   <d/pc_ndp_mod/n_br_adr/OUT[1]'        139.0                fall
   <od/pc_ndp_mod/n_br_adr/IN1[1]        138.3                rise
   <_gen_mod/pc_ndp_mod/x1/OUT[1]        138.3                rise
   <gen_mod/pc_ndp_mod/x1/OUT[1]'        138.1                rise
   pc_gen_mod/pc_ndp_mod/x1/IN[1]        137.7                fall
   <en_mod/pc_ndp_mod/n_x1/OUT[1]        137.7                fall
   <n_mod/pc_ndp_mod/n_x1/OUT[1]'        137.7                fall
   <en_mod/pc_ndp_mod/n_x1/SEL[0]        135.3                rise
   pc_gen_mod/flush_ctrl/dis_tp          134.6                rise
   pc_gen_mod/flush_ctrl/dis_tp'         131.4                rise
   <_mod/flush_ctrl/GB.LP.NNZ5fN5        131.0                fall
   <mod/flush_ctrl/GB.LP.NNZ5fN10        130.1                rise
   <mod/flush_ctrl/GB.LP.NNZ5fN20        129.4                fall
   <mod/flush_ctrl/GB.LP.NNZ5fN12        128.9                rise
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pc_gen_mod/flush_ctrl/rs	127.8	fall
task_ptr_mod/task_ptr_ctrl/rs	126.9	fall
task_ptr_mod/task_ptr_ctrl/rs'	125.3	fall
<_ptr_mod/task_ptr_ctrl/rs_out	124.2	fall
task_ptr_mod/tp_en_dec/rs_out	124.2	fall
task_ptr_mod/tp_en_dec/rs_out'	122.8	fall
<r_mod/tp_en_dec/GB.LP.NNZ5fN3	122.3	rise
<n_dec/GB.LP.NNin2Z2eINZ5b0Z5d	121.5	fall
<od/tp_en_dec/valid_intr_pulse	121.1	rise
<r_mod/valid_intr_ctrl/vip_out	118.0	rise
<_mod/valid_intr_ctrl/vip_out'	108.5	rise
<alid_intr_ctrl/GB.LP.NNZ5fN21	108.2	fall
<alid_intr_ctrl/GB.LP.NNZ5fN11	106.5	rise
<valid_intr_ctrl/GB.LP.NNZ5fN7	105.3	fall
<valid_intr_ctrl/GB.LP.NNZ5fN0	104.7	rise
<valid_intr_ctrl/GB.LP.NNZ5fN6	103.1	fall
<valid_intr_ctrl/GB.LP.NNZ5fN3	102.5	rise
<alid_intr_ctrl/GB.LP.NNZ5fN10	100.5	rise
<P.NNnpassintZ2eoutZ5fxZ5b0Z5d	98.6	fall
*</valid_intr_ctrl/n_pass_intr	95.5	fall
<_mod/pass_intr_dp/n_pass_intr	95.5	fall
<mod/pass_intr_dp/n_pass_intr'	95.0	fall
</pass_intr_dp/req_intr_adr[0]	86.9	rise
</priority_pla/req_intr_adr[0]	86.8	rise
<priority_pla/req_intr_adr[0]'	73.6	rise
<od/priority_pla/GB.LP.NNZ5fN1	73.2	fall
<d/priority_pla/GB.LP.NNZ5fN36	72.6	rise
<d/priority_pla/GB.LP.NNZ5fN47	71.4	fall
<d/priority_pla/GB.LP.NNZ5fN51	71.0	rise
<d/priority_pla/GB.LP.NNZ5fN40	69.4	fall
<d/priority_pla/GB.LP.NNZ5fN12	68.7	rise
<d/priority_pla/GB.LP.NNZ5fN14	66.2	rise
</priority_pla/current_intr[4]	62.7	fall
<r_mod/intr_dp/current_intr[4]	62.6	fall
<_mod/intr_dp/current_intr[4]'	62.6	fall
<r_mod/intr_dp/phb_lat_VAL1[4]	61.0	fall
intr_mod/intr_dp/guarded_ei	52.5	rise
intr_mod/ld_ctrl/guarded_ei	52.5	rise
intr_mod/ld_ctrl/guarded_ei'	50.7	rise
intr_mod/ld_ctrl/n_guard	49.5	rise
io_mod/ids_sel/n_guard_out	47.7	rise
io_mod/ids_sel/n_guard_out'	42.0	rise
io_mod/ids_sel/n_guard	41.0	rise
io_mod/freeze_ctrl/n_guard	40.9	rise
io_mod/freeze_ctrl/n_guard'	39.6	rise
<od/freeze_ctrl/GB.LP.NNZ5fN14	39.3	fall
<od/freeze_ctrl/GB.LP.NNZ5fN34	38.6	rise
<mod/freeze_ctrl/GB.LP.NNZ5fN2	37.5	fall
<mod/freeze_ctrl/GB.LP.NNZ5fN6	37.0	rise
<mod/freeze_ctrl/GB.LP.NNZ5fN9	35.3	rise
io_mod/freeze_ctrl/ids_freeze	33.9	fall
io_mod/test_ctrl/ids_freeze	33.8	fall
io_mod/test_ctrl/ids_freeze'	32.2	fall
io_mod/test_ctrl/ids_fr_lat	30.9	fall

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   io_mod/test_ctrl/ids_fr_lat'        30.8              fall
   io_mod/test_ctrl/ids_freeze_in      28.0              fall
   io_mod/ds_ctrl/ids_freeze_in        28.0              fall
   io_mod/ds_ctrl/ids_freeze_in'       28.0              fall
   io_mod/ds_ctrl/async_ids_fr         26.2              fall
   <d/async_ids_ctrl/async_ids_fr      26.2              fall
   </async_ids_ctrl/async_ids_fr'      25.8              fall
   <async_ids_ctrl/GB.LP.NNZ5fN27      25.4              rise
   <async_ids_ctrl/GB.LP.NNZ5fN15      23.3              fall
   <async_ids_ctrl/GB.LP.NNZ5fN18      22.7              rise
   <async_ids_ctrl/GB.LP.NNZ5fN28      21.2              fall
   </async_ids_ctrl/GB.LP.NNZ5fN6      19.4              rise
   <async_ids_ctrl/GB.LP.NNZ5fN12      18.4              fall
   io_mod/async_ids_ctrl/ids_sel       17.9              rise
   io_mod/ids_sel/ids_sel              17.7              rise
   io_mod/ids_sel/ids_sel'             14.3              rise
   io_mod/ids_sel/ids_sel_buf          13.3              rise
   io_mod/ids_sel/ids_sel_buf'         13.0              rise
   io_mod/ids_sel/ids_ph_in            10.8              rise
   io_mod/ids_sel/ids_ph_out           10.8              rise
   io_mod/ids_sel/ids_ph_out'          10.7              rise
   io_mod/ids_sel/PHASE_B               8.7              rise
   clk_pad/PHASE_B                      8.8              rise
   Clk                                  0.0              fall
-------------------------------------------------------------------------------
 ******************************************************************************
              Genesil Version v8.0.2 -- Mon Feb  4 12:15:29 1991
Chip: /tmp_mnt/net/yoda/mnta/iag/iag/gt_vic/iag                 Timing Analyzer
******************************************************************************
OUTPUT DELAY MODE
-------------------------------------------------------------------------------
Fabline: HP2_CN10B                    Corner: GUARANTEED
  Junction Temperature:117 deg C      Voltage:4.50v
  External Clock: Clk
 Included setup files:
  #0  basic                 (Input constraints from other chip>
  #1  worst                 (117 deg C, 4.5 Volts)
-------------------------------------------------------------------------------
                              OUTPUT DELAYS (ns)
Output                    Ph1(r) Delay      Ph2(r) Delay      Loading(pf)
                          Min      Max      Min      Max
ALU_opcode[0]             24.8     27.0     ---      ---      50.00   PATH
ALU_opcode[1]             24.9     27.1     ---      ---      50.00   PATH
ALU_opcode[2]             24.3     26.6     ---      ---      50.00   PATH
ALU_opcode[3]             24.4     26.7     ---      ---      50.00   PATH
ALU_opcode[4]             24.5     26.8     ---      ---      50.00   PATH
ALU_opcode[5]             24.4     26.7     ---      ---      50.00   PATH
ALU_opcode[6]             24.6     26.8     ---      ---      50.00   PATH
ALU_opcode[7]             24.6     26.8     ---      ---      50.00   PATH
Booting                   25.7     28.0     ---      ---      50.00   PATH
DAG_R_en                  29.9     93.9     35.0     51.8     50.00   PATH
Dr                        39.6     99.3     49.2     53.3     50.00   PATH
Flush                     23.7     47.4      ---      ---     50.00   PATH
Freeze                    32.3     90.3     33.9     53.2     50.00   PATH
```

Guard	35.5	99.0	38.7	61.9	50.00	PATH
Ids_eq_ods_1	33.9	39.1	---	---	50.00	PATH
Ids_eq_ods_2	35.0	39.6	---	---	50.00	PATH
Ids_freeze	24.5	30.0	21.4	42.4	50.00	PATH
Ids_sel	21.6	28.0	24.4	24.4	50.00	PATH
Inst[0]	---	---	22.2	27.5	50.00	PATH
Inst[10]	---	---	23.8	27.1	50.00	PATH
Inst[11]	---	---	23.7	27.1	50.00	PATH
Inst[12]	---	---	23.7	27.0	50.00	PATH
Inst[13]	---	---	23.5	27.0	50.00	PATH
Inst[14]	---	---	23.3	27.0	50.00	PATH
Inst[15]	---	---	23.2	27.0	50.00	PATH
Inst[16]	---	---	23.3	27.0	50.00	PATH
Inst[17]	---	---	23.4	27.0	50.00	PATH
Inst[18]	---	---	23.4	27.0	50.00	PATH
Inst[19]	---	---	23.5	27.0	50.00	PATH
Inst[1]	---	---	22.3	27.5	50.00	PATH
Inst[20]	---	---	23.4	27.0	50.00	PATH
Inst[21]	---	---	23.6	27.0	50.00	PATH
Inst[22]	---	---	23.7	27.0	50.00	PATH
Inst[23]	---	---	23.8	27.0	50.00	PATH
Inst[24]	---	---	22.8	27.4	50.00	PATH
Inst[25]	---	---	22.7	27.4	50.00	PATH
Inst[26]	---	---	23.5	27.4	50.00	PATH
Inst[27]	---	---	23.5	27.4	50.00	PATH
Inst[28]	---	---	23.6	27.4	50.00	PATH
Inst[29]	---	---	23.7	27.4	50.00	PATH
Inst[2]	---	---	22.5	27.5	50.00	PATH
Inst[30]	---	---	24.1	27.4	50.00	PATH
Inst[31]	---	---	24.0	27.4	50.00	PATH
Inst[32]	---	---	23.9	27.7	50.00	PATH
Inst[33]	---	---	23.9	27.7	50.00	PATH
Inst[34]	---	---	24.0	27.7	50.00	PATH
Inst[35]	---	---	24.1	27.7	50.00	PATH
Inst[36]	---	---	24.2	27.8	50.00	PATH
Inst[37]	---	---	24.3	27.8	50.00	PATH
Inst[38]	---	---	24.6	27.8	50.00	PATH
Inst[39]	---	---	24.7	27.8	50.00	PATH
Inst[3]	---	---	22.6	27.5	50.00	PATH
Inst[40]	---	---	24.5	30.8	50.00	PATH
Inst[41]	---	---	25.3	31.0	50.00	PATH
Inst[42]	---	---	23.9	30.2	50.00	PATH
Inst[43]	---	---	23.7	30.2	50.00	PATH
Inst[44]	---	---	22.8	30.3	50.00	PATH
Inst[45]	---	---	22.8	30.3	50.00	PATH
Inst[4]	---	---	24.5	27.5	50.00	PATH
Inst[5]	---	---	24.4	27.5	50.00	PATH
Inst[6]	---	---	24.2	27.5	50.00	PATH
Inst[7]	---	---	24.0	27.4	50.00	PATH
Inst[8]	---	---	23.9	27.1	50.00	PATH
Inst[9]	---	---	23.9	27.1	50.00	PATH
Inst_en	---	---	24.3	24.7	50.00	PATH
Inst_rd	26.1	90.1	---	---	50.00	PATH
Ios	22.4	24.2	---	---	50.00	PATH

Kernel_mode	41.4	50.9	---	---	50.00	PATH
N_cs_pha	25.1	25.1	16.6	25.1	50.00	PATH
N_cs_phb	24.3	24.3	19.6	25.9	50.00	PATH
N_inst_wr	22.7	22.7	15.4	15.4	50.00	PATH
N_read[1]	23.5	30.0	27.5	29.0	50.00	PATH
N_reset_out	28.8	44.1	---	---	50.00	PATH
N_write[1]	19.7	46.1	23.0	34.2	50.00	PATH
Ncs[1]	18.3	27.1	21.5	25.3	50.00	PATH
Ncs[2]	19.4	28.1	22.5	26.2	50.00	PATH
Ncs[3]	19.8	28.5	23.0	26.6	50.00	PATH
Ods_freeze	25.5	79.8	28.8	30.7	50.00	PATH
Ods_ids[0]	29.7	91.1	34.2	41.7	50.00	PATH
Ods_ids[1]	29.3	90.8	33.8	41.3	50.00	PATH
Ods_ids[2]	29.6	91.1	34.2	41.7	50.00	PATH
Ods_ids[3]	29.6	91.1	34.2	41.7	50.00	PATH
Ods_sel	22.1	29.9	28.6	28.6	50.00	PATH
Pc[0]	---	---	17.1	21.4	50.00	PATH
Pc[10]	---	---	16.7	21.0	50.00	PATH
Pc[11]	---	---	16.7	20.9	50.00	PATH
Pc[12]	---	---	16.6	20.9	50.00	PATH
Pc[13]	---	---	16.5	20.8	50.00	PATH
Pc[14]	---	---	16.8	21.1	50.00	PATH
Pc[15]	---	---	16.9	21.2	50.00	PATH
Pc[16]	---	---	17.0	21.2	50.00	PATH
Pc[17]	---	---	17.0	21.3	50.00	PATH
Pc[18]	---	---	17.1	21.3	50.00	PATH
Pc[19]	---	---	17.1	21.4	50.00	PATH
Pc[1]	---	---	17.1	21.3	50.00	PATH
Pc[20]	---	---	17.2	21.5	50.00	PATH
Pc[21]	---	---	17.3	21.5	50.00	PATH
Pc[22]	---	---	17.4	21.6	50.00	PATH
Pc[23]	---	---	17.3	21.6	50.00	PATH
Pc[24]	---	---	17.3	21.6	50.00	PATH
Pc[25]	---	---	17.4	21.6	50.00	PATH
Pc[2]	---	---	17.1	21.4	50.00	PATH
Pc[3]	---	---	17.0	21.3	50.00	PATH
Pc[4]	---	---	17.0	21.3	50.00	PATH
Pc[5]	---	---	17.0	21.3	50.00	PATH
Pc[6]	---	---	17.0	21.3	50.00	PATH
Pc[7]	---	---	17.0	21.2	50.00	PATH
Pc[8]	---	---	17.0	21.2	50.00	PATH
Pc[9]	---	---	16.9	21.2	50.00	PATH
RF[0]	28.4	131.2	31.7	49.3	50.00	PATH
RF[10]	26.9	130.2	33.4	58.5	50.00	PATH
RF[11]	26.7	130.1	33.4	52.1	50.00	PATH
RF[12]	26.6	130.1	33.4	49.9	50.00	PATH
RF[13]	26.5	130.0	33.4	49.9	50.00	PATH
RF[14]	26.2	130.0	33.4	50.5	50.00	PATH
RF[15]	26.7	130.5	33.5	49.9	50.00	PATH
RF[16]	27.1	130.8	31.1	81.2	50.00	PATH
RF[17]	26.9	130.7	31.1	54.3	50.00	PATH
RF[18]	26.2	130.2	31.1	57.4	50.00	PATH
RF[19]	26.6	130.5	31.1	54.5	50.00	PATH
RF[1]	28.3	131.1	31.7	49.2	50.00	PATH

RF[20]	27.8	131.5	31.1	49.0	50.00	PATH
RF[21]	26.8	130.7	31.1	48.2	50.00	PATH
RF[22]	26.3	130.3	31.1	78.3	50.00	PATH
RF[23]	25.7	130.0	31.1	47.6	50.00	PATH
RF[24]	25.1	129.5	33.7	50.2	50.00	PATH
RF[25]	25.5	132.6	33.7	52.2	50.00	PATH
RF[26]	24.6	92.2	33.6	50.1	50.00	PATH
RF[27]	24.5	92.2	33.6	50.1	50.00	PATH
RF[28]	24.0	92.2	33.6	50.1	50.00	PATH
RF[29]	23.9	92.2	33.6	50.0	50.00	PATH
RF[2]	28.2	131.0	31.8	49.1	50.00	PATH
RF[30]	23.7	92.1	33.6	50.0	50.00	PATH
RF[31]	23.6	92.1	33.6	50.0	50.00	PATH
RF[3]	28.1	130.9	31.8	49.0	50.00	PATH
RF[4]	27.9	130.8	31.8	48.9	50.00	PATH
RF[5]	27.8	130.7	31.8	48.8	50.00	PATH
RF[6]	27.7	130.7	31.8	48.7	50.00	PATH
RF[7]	27.6	130.6	31.8	48.7	50.00	PATH
RF[8]	27.2	130.4	33.4	57.6	50.00	PATH
RF[9]	27.3	130.5	33.4	54.3	50.00	PATH
Read[2]	34.3	40.7	34.5	39.3	50.00	PATH
Read[3]	39.5	45.9	39.2	44.6	50.00	PATH
Valid_intr_pulse	34.1	62.5	---	---	50.00	PATH
Write[2]	21.4	46.7	25.2	26.7	50.00	PATH
Write[3]	21.5	46.8	25.4	26.9	50.00	PATH

****

Genesil Version v8.0.2 -- Mon Feb 4 12:19:35 1991

Chip: /tmp_mnt/net/yoda/mnta/iag/iag/gt_vic/iag Timing Analyzer

****

SETUP AND HOLD MODE

Fabline: HP2_CN10B Corner: GUARANTEED

Junction Temperature:117 deg C Voltage:4.50v

External Clock: Clk

Included setup files:

#0 basic (Input constraints from other chip>

#1 worst (117 deg C, 4.5 Volts)

INPUT SETUP AND HOLD TIMES (ns)

Input	Setup Time		Hold Time		
	Ph1(f)	Ph2(f)	Ph1(f)	Ph2(f)	
ALU_Flag	42.9	4.6	0.8	-3.0	PATH
Carry	42.2	4.6	0.8	-3.1	PATH
DAG_error	---	12.1	---	-5.2	PATH
DAV[1]	---	77.2	---	-12.3	PATH
DAV[2]	---	77.9	---	-12.3	PATH
DAV[3]	---	78.3	---	-12.9	PATH
Dr	38.4	81.6	-4.4	-3.2	PATH
IAG_test[0]	---	72.4	---	0.4	PATH
IAG_test[1]	---	72.3	---	0.2	PATH
Inst[0]	---	5.9	---	-3.1	PATH
Inst[10]	---	7.6	---	-4.3	PATH
Inst[11]	---	7.3	---	-4.3	PATH
Inst[12]	---	4.9	---	-2.9	PATH

Inst[13]	---	4.7	---	-2.7	PATH
Inst[14]	---	4.4	---	-2.3	PATH
Inst[15]	---	4.3	---	-2.2	PATH
Inst[16]	---	4.3	---	-2.2	PATH
Inst[17]	---	4.4	---	-2.3	PATH
Inst[18]	---	4.4	---	-2.3	PATH
Inst[19]	---	4.5	---	-2.5	PATH
Inst[1]	---	6.2	---	-3.3	PATH
Inst[20]	---	4.6	---	-2.5	PATH
Inst[21]	---	4.6	---	-2.6	PATH
Inst[22]	---	4.6	---	-2.5	PATH
Inst[23]	---	4.2	---	-2.1	PATH
Inst[24]	---	4.1	---	-2.0	PATH
Inst[25]	---	4.1	---	-2.0	PATH
Inst[26]	---	7.2	---	-3.5	PATH
Inst[27]	---	7.6	---	-3.6	PATH
Inst[28]	---	8.6	---	-4.2	PATH
Inst[29]	---	7.7	---	-4.1	PATH
Inst[2]	---	7.5	---	-4.7	PATH
Inst[30]	---	4.0	---	-2.1	PATH
Inst[31]	---	4.5	---	-2.6	PATH
Inst[32]	---	4.0	---	-2.1	PATH
Inst[33]	---	4.0	---	-2.1	PATH
Inst[34]	---	4.0	---	-2.1	PATH
Inst[35]	---	4.0	---	-2.1	PATH
Inst[36]	---	4.0	---	-2.1	PATH
Inst[37]	---	5.6	---	-3.8	PATH
Inst[38]	---	8.0	---	-3.4	PATH
Inst[39]	---	8.2	---	-3.6	PATH
Inst[3]	---	7.8	---	-4.8	PATH
Inst[40]	---	8.4	---	-3.8	PATH
Inst[41]	---	8.1	---	-3.7	PATH
Inst[42]	---	10.3	---	-5.6	PATH
Inst[43]	---	10.2	---	-5.5	PATH
Inst[44]	---	9.9	---	-5.2	PATH
Inst[45]	---	9.8	---	-5.1	PATH
Inst[4]	---	8.2	---	-4.7	PATH
Inst[5]	---	7.2	---	-4.6	PATH
Inst[6]	---	8.3	---	-4.7	PATH
Inst[7]	---	7.2	---	-4.5	PATH
Inst[8]	---	7.5	---	-4.3	PATH
Inst[9]	---	7.2	---	-4.3	PATH
Inst_rdy	---	26.9	---	1.1	PATH
Intr[0]	---	9.9	---	-7.5	PATH
Intr[1]	---	10.0	---	-7.5	PATH
Intr[2]	---	10.1	---	-7.6	PATH
Intr[3]	---	10.1	---	-7.6	PATH
Intr[4]	---	10.2	---	-7.7	PATH
Intr[5]	---	10.2	---	-7.7	PATH
Intr[6]	---	10.3	---	-7.8	PATH
Intr[7]	---	10.4	---	-7.9	PATH
Intr[8]	---	9.4	---	-6.8	PATH
N_reset	-4.6	---	6.9	---	PATH
Pixel_clk	39.9	83.7	-18.5	-1.7	PATH

RFI[1]	36.5	---	-1.4	---	PATH
RFI[2]	36.3	---	-1.6	---	PATH
RFI[3]	36.4	---	-1.2	---	PATH
RF[0]	1.4	2.8	-0.2	0.7	PATH
RF[10]	1.6	2.9	-0.3	0.5	PATH
RF[11]	1.5	2.8	-0.3	0.5	PATH
RF[12]	1.4	2.8	-0.2	0.6	PATH
RF[13]	1.9	3.2	-0.8	0.1	PATH
RF[14]	1.3	2.6	-0.1	0.8	PATH
RF[15]	1.3	2.6	-0.1	0.7	PATH
RF[16]	1.5	2.8	-0.3	0.5	PATH
RF[17]	1.4	2.7	-0.2	0.6	PATH
RF[18]	1.1	2.4	0.1	1.0	PATH
RF[19]	1.3	2.7	-0.1	0.7	PATH
RF[1]	3.3	4.6	-2.2	-1.4	PATH
RF[20]	1.0	2.3	0.2	1.1	PATH
RF[21]	1.1	2.5	0.1	0.9	PATH
RF[22]	1.4	2.7	-0.2	0.7	PATH
RF[23]	1.7	3.0	-0.5	0.4	PATH
RF[24]	1.7	3.0	-0.6	0.3	PATH
RF[25]	2.2	3.5	-1.0	-0.1	PATH
RF[26]	---	-0.6	---	1.8	PATH
RF[27]	---	-0.7	---	1.9	PATH
RF[28]	---	-0.9	---	2.1	PATH
RF[29]	---	-1.0	---	2.2	PATH
RF[2]	1.5	2.8	-0.2	0.6	PATH
RF[30]	---	-1.1	---	2.3	PATH
RF[31]	---	-1.2	---	2.4	PATH
RF[3]	1.5	2.8	-0.2	0.6	PATH
RF[4]	1.5	2.8	-0.2	0.6	PATH
RF[5]	3.1	4.5	-2.1	-1.2	PATH
RF[6]	1.5	2.9	-0.3	0.5	PATH
RF[7]	1.6	2.9	-0.3	0.5	PATH
RF[8]	1.5	2.8	-0.3	0.5	PATH
RF[9]	2.2	3.5	-1.0	-0.2	PATH
R_eq_f_1	---	62.7	---	-6.4	PATH
R_eq_f_2	---	5.7	---	-2.1	PATH
S_eq_f_1	---	5.2	---	-3.7	PATH
S_eq_f_2	---	5.3	---	-3.9	PATH
Sign	43.1	4.4	1.0	-2.9	PATH
Status[0]	28.3	---	-3.5	---	PATH
Status[1]	28.3	---	-3.5	---	PATH
Status[2]	31.1	---	-6.1	---	PATH
Status[3]	27.7	---	-2.6	---	PATH
Status[4]	27.1	---	-2.5	---	PATH
Zero	42.4	4.4	1.0	-2.8	PATH

```
 ********************************************************************************
              Genesil Version v8.0.2 -- Mon Feb  4 12:20:05 1991
Chip: /tmp_mnt/net/yoda/mnta/iag/iag/gt_vic/iag                  Timing Analyzer
********************************************************************************
PATH DELAY MODE
--------------------------------------------------------------------------------
Fabline: HP2_CN10B                      Corner: GUARANTEED
  Junction Temperature:117 deg C        Voltage:4.50v
```

```
 External Clock: Clk
Included setup files:
 #0  basic                  (Input constraints from other chip>
 #1  worst                  (117 deg C, 4.5 Volts)
-------------------------------------------------------------------------------
                                PATH DELAY (ns)
Source Object     Connector          (Ph1) Min      Max
   Dest. Object       Connector      (Ph2)    Min      Max

 _______________ _________________
 clk_pad_________ PHASE_A_________        9.5     21.7
    ____________ _________________
    io_mod/sel1_____ ods_en__________      18.8     23.1  PATH
 _______________ _________________
 io_mod/sel1____ ods_en__________        ---      ---
    ____________ _________________
    *CURRENT*_______ Ncs[1]__________       ---      ---  PATH
 _______________ _________________
 clk_pad_________ PHASE_A_________        8.8      9.5
    ____________ _________________
    io_mod/sel1_____ ods_inst[3]_____       ---      ---  PATH
 _______________ _________________
 io_mod/sel1____ ods_inst[3]_____        ---      ---
    ____________ _________________
    *CURRENT*_______ Ncs[1]__________       ---      ---  PATH
 _______________ _________________
 clk_pad_________ PHASE_A_________        9.5     21.7
    ____________ _________________
    io_mod/sel1_____ ods_en__________      18.8     23.1  PATH
 _______________ _________________
 io_mod/sel1____ ods_en__________       14.9     15.9
    ____________ _________________
    *CURRENT*_______ N_write[1]______       ---      ---  PATH
 _______________ _________________
 clk_pad_________ PHASE_A_________        8.8      9.5
    ____________ _________________
    io_mod/sel1_____ ods_inst[3]_____       ---      ---  PATH
 _______________ _________________
 io_mod/sel1____ ods_inst[3]_____        ---      ---
    ____________ _________________
    *CURRENT*_______ N_write[1]______       ---      ---  PATH
 _______________ _________________
 io_mod/io_dp___ ods_en__________       15.6     17.4
    ____________ _________________
    *CURRENT*_______ Ods_ids[2]______      15.6     17.4  PATH
 _______________ _________________
 io_mod/io_dp___ ids_sel_________       16.2     19.5
    ____________ _________________
    *CURRENT*_______ Ods_ids[2]______      16.2     19.5  PATH
 _______________ _________________
 io_mod/io_dp___ dff1_VAL1[2]____       17.0     18.9
    ____________ _________________
    *CURRENT*_______ Ods_ids[2]______      17.0     18.9  PATH
 _______________ _________________
>_______________ _________________
```

```
 ********************************************************************************
              Genesil Version v8.0.2 -- Mon Feb  4 12:20:09 1991
Chip: /tmp_mnt/net/yoda/mnta/iag/iag/gt_vic/iag                 Timing Analyzer
 ********************************************************************************
NODE DELAY MODE
--------------------------------------------------------------------------------
Fabline: HP2_CN10B                      Corner: GUARANTEED
  Junction Temperature:117 deg C        Voltage:4.50v
  External Clock: Clk
 Included setup files:
  #0  basic                  (Input constraints from other chip>
  #1  worst                  (117 deg C, 4.5 Volts)
--------------------------------------------------------------------------------
NODE DELAYS (ns)
Object           Connector      Ph1(r) Delay    Ph2(r) Delay
                                 Min    Max      Min    Max

 ______________ _______________
 io_mod/io_dp__ ods_en________   18.0   30.1     21.7   26.1 PATH
 ______________ _______________
 io_mod/io_dp__ ids_sel______   13.3   19.7     18.0   18.0 PATH
 ______________ _______________
 io_mod/io_dp__ dff1_VAL1[2]_   12.6   13.2      ---    --- PATH
 ______________ _______________
>______________ _______________
 ********************************************************************************
              Genesil Version v8.0.2 -- Mon Feb  4 12:20:18 1991
Chip: /tmp_mnt/net/yoda/mnta/iag/iag/gt_vic/iag                 Timing Analyzer
 ********************************************************************************
VIOLATION MODE
--------------------------------------------------------------------------------
Fabline: HP2_CN10B                      Corner: GUARANTEED
  Junction Temperature:117 deg C        Voltage:4.50v
  External Clock: Clk
 Included setup files:
  #0  basic                  (Input constraints from other chip>
  #1  worst                  (117 deg C, 4.5 Volts)
--------------------------------------------------------------------------------
                                NO VIOLATIONS
  Hold time check margin: 2.0ns
```

DV CHECKLIST

1. DV CONTROL NUMBER : _____

2. CUSTOMER INFORMATION

Customer Name : Georgia Tech / CERL Chip Name : GT–VIAG

Address : 400 Tenth Street FAX : (404) 894–3120

CRB Room 377

Atlanta, GA 30332–0540

Project Manager : Dr. C. O. Alford Phone : (404) 894–2505

Design Engineer : Dr. Wei Siong Tan Phone : (404) 894–2508

Samuel H. Russ Phone : (404) 894–7472

Test Engineer : Joseph I. Chamdani Phone : (404) 894–2527

3. SERVICES INFORMATION

xx Design Verification Service only. PO #_____

_____ Prototype Service and Design Verification. PO #_____

_____ 1.8% Maintenance

_____ SCS Test _____ Foundry Test _____ Customer Test

When DV is complete, send verified physical database tape to

Customer Y N Silicon Vendor Y N

4. DV CONTACT : Ying Chow Phone : (408) 371–2900

5. REGRESSION

5.1. GENESIL Version : 8.0.2
5.2. Name of Session Log from recompile : rebuild.LOG
5.3. Include DV regression.CMD : DV_regression.001 (simulation and timing)
5.4. Size of database (MB) : 127 Guess ___ Density : 6250 ___ 1600 ___ TK50 ___
Tar xx wbak ___ Apollo Cartridge ___
(compressed) Sun Cartridge xx

6. FUNCTIONAL INFORMATION (check when included)

6.1. Number of Transistors : xx
6.2. Key Parameters : xx Testing ___
6.3. DV pin description : xx Testing ___
6.4. Block Diagram : ___ Testing xx
6.5. Functional Description : ___ Testing xx
6.6. Timing Diagrams at Pins : ___ Testing xx
6.7. Annotated Views : ___ Testing xx Annotated Schematics : ___ Testing xx
6.8. Chip Text Specification on tape : xx Density: 6250___ 1600___ TK50___
(iag_text_spec.012.Z) Apollo Cartridge___
Sun Cartridge xx

7. PHYSICAL INFORMATION

7.1. Fabline Name : HP2_CN10B
Customer–Specific : Y N Fabline GENECAL Directory on tape : Y N
Fabline GENESIL Directory on tape : Y N
Fabline Calibration Status : Production : ___ Beta : ___ Alpha : xx
NOTE: If not a production fabline, then approval from SCS is required.

7.2. Plots: (check when included or indicate filename)
Chip Route (D size) : xx Bonding Diagram (B size) : xx
Route Filename : route_d_1.031 Bonding Filename : bond_b_1.031

7.3. Die Size : Reported Die Size : 417 x 425 square–mils
Maximum Acceptable Die Size (+/– 2%) : 440 x 440 square–mils
Minimum Acceptable Die Size (+/– 2%) : 280 x 280 square–mils

7.4. GENESIL Package Name : CPGA224f2 Spec included? Y N
Cavity/Well Size : 480 mils by 480 mils
Non–GENESIL Supplied Package? Y N Text Spec included on tape? Y N
Vendor Name/Part # : KYOCERA KD–P86077C Foundry Approval? Y N

7.5. External Block: none

7.6. LRAM: Y N LROM: Y N LPLA: Y N LogicCompiler Blocks: Y N

7.7. Test Pad (PM Pad) is included? Y N (Required for PS)

7.8. Power Pad : VDD: Core 4 VSS: Core 4
Ring 13 Ring 12

NP protection for nwell pad? Y N

TTL output pads or N Protection for inputs? Y N
If yes, have you received silicon vendor approval? Y N

Error in PADRING.033 (PADRING.DRC)? Y N Hardcopy attached? Y N

ESD requirements _____ Approved by SCS? Y N

8. ELECTRICAL INFORMATION

8.1. Chip Frequency Specified in netlist : 10.0 MHz Target frequency : 10.0 MHz
8.2. Power Dissipation: GENESIL = 1.18 W at 10 MHz Spec = 1.0 W at 10.0 MHz
8.3. Operating Voltage: from 4.5 Volts to 5.5 Volts

9. SIMULATION

9.1. Number of Clocking Regimes : 1

	Clock Pad Name	DIV/NO DIV	Ext Clock Name	Int PHASE A/PHASE B Name
1.	clock_pad	NO_DIV	Clk	PHASE_A / PHASE_B
2.				
3.				
4.				
5.				

9.2. Simulation Setup Files:
Name : designinit.080 Listings attached : Yes
Description : Sets up Clk and tags for cycles and steps.
Affected Tests : Required for simulation with .089's, not needed for traceobj output.

Name : _____ Listings attached : _____
Description : _____
Affected Tests : _____

Name : _____ Listings attached : _____
Description : _____
Affected Tests : _____

Name : _____ Listings attached : _____
Description : _____
Affected Tests : _____

9.3. Test Vector Set:
Total No. of Vectors : 29,734

NOTE : Test vectors written one phase per vector have a maximum test frequency on the IMS Tester of 10 MHz.
Test vectors written one cycle per vector have a maximum test frequency on the IMS Tester of 20 MHz.

1. Name : add_trace.083 No of vectors : 3494
Description : Tests all adders.

Portions of Chip Tested : Various

Pass with GFL model? xx
Pass with GSL model? xx Use for PS testing? Y N
Pass Fight Test? xx

2. Name : boot_trace.083 No of vectors : 108
Description : Tests bootstrap mode.

Portions of Chip Tested : Various.

Pass with GFL model? xx
Pass with GSL model? xx Use for PS testing? Y N
Pass Fight Test? xx

3. Name : branch_trace.083 No of vectors : 546
Description : Tests branching modes and opcodes.

Portions of Chip Tested : pc_gen_mod

Pass with GFL model? xx
Pass with GSL model? xx Use for PS testing? Y N
Pass Fight Test? xx

4. Name : dp_trace.083 No of vectors : 2704
Description : Tests logic contained in parallel datapaths on–chip.

Portions of Chip Tested : Various.

Pass with GFL model? xx
Pass with GSL model? xx Use for PS testing? Y N
Pass Fight Test? xx

5. Name : dssio_trace.083 No of vectors : 1616
Description : Tests DSS I/O mode.

Portions of Chip Tested : io_mod

Pass with GFL model? xx
Pass with GSL model? xx Use for PS testing? Y N
Pass Fight Test? xx

6. Name : flush_trace.083 No of vectors : 1710
Description : Tests flush signal.

Portions of Chip Tested : pc_gen_mod, etc.

Pass with GFL model? xx
Pass with GSL model? xx Use for PS testing? Y N
Pass Fight Test? xx

7. Name : freeze_trace.083 No of vectors : 1132
Description : Tests freeze signal.

Portions of Chip Tested : io_mod, etc.

Pass with GFL model? xx
Pass with GSL model? xx Use for PS testing? Y N
Pass Fight Test? xx

8. Name : grd_trace.083 No of vectors : 1322
Description : Tests guard signal.

Portions of Chip Tested : io_mod, etc.

Pass with GFL model? xx
Pass with GSL model? xx Use for PS testing? Y N
Pass Fight Test? xx

9. Name : iag_test_trace.083 No of vectors : 2220
Description : Tests IAG's special test mode.

Portions of Chip Tested : Various.

Pass with GFL model? xx
Pass with GSL model? xx Use for PS testing? Y N
Pass Fight Test? xx

10. Name : inst_rdy_trace.083 No of vectors : 498
Description : Tests behavior of chip in its interaction with the inst_rdy signal.

Portions of Chip Tested : inst_en, various

Pass with GFL model? xx
Pass with GSL model? xx Use for PS testing? Y N
Pass Fight Test? xx

11. Name : intr_trace.083 No of vectors : 480
Description : Tests interrupts.

Portions of Chip Tested : intr_mod, etc.

Pass with GFL model? xx
Pass with GSL model? xx Use for PS testing? Y N
Pass Fight Test? xx

12. Name : io_intr_trace.083 No of vectors : 694
Description : Tests interruption of I/O operations.

Portions of Chip Tested : io_mod, intr_mod

Pass with GFL model? xx
Pass with GSL model? xx Use for PS testing? Y N
Pass Fight Test? xx

13. Name : io_trace.083 No of vectors : 268
Description : Tests I/O

Portions of Chip Tested : io_mod

Pass with GFL model? xx
Pass with GSL model? xx Use for PS testing? Y N
Pass Fight Test? xx

14. Name : ios_trace.083 No of vectors : 202
Description : Tests generation of Ios signal.

Portions of Chip Tested : io_mod/ios_ctrl

Pass with GFL model? xx
Pass with GSL model? xx Use for PS testing? Y N
Pass Fight Test? xx

15. Name : iosat_trace.083 No of vectors : 3833
Description : Generated by performing a traceobj of the GT–EP chipset.

Portions of Chip Tested : Various

Pass with GFL model? xx
Pass with GSL model? xx Use for PS testing? Y N
Pass Fight Test? xx

16. Name : kernel_trace.083 No of vectors : 1070
Description : Tests to confirm kernel instructions are not executed in user mode.

Portions of Chip Tested : Various

Pass with GFL model? xx
Pass with GSL model? xx Use for PS testing? Y N
Pass Fight Test? xx

17. Name : ldst_trace.083 No of vectors : 308
Description : Tests load and store instructions.

Portions of Chip Tested : Various

Pass with GFL model? xx
Pass with GSL model? xx Use for PS testing? Y N
Pass Fight Test? xx

18. Name : reg_test_trace.083 No of vectors : 1158
Description : Loads all registers with test patterns.

Portions of Chip Tested : Various.

Pass with GFL model? xx
Pass with GSL model? xx Use for PS testing? Y N
Pass Fight Test? xx

19. Name : sort4_trace.083 No of vectors : 4517
Description : Generated by performing a traceobj of the GT–EP chipset.

Portions of Chip Tested : Various

Pass with GFL model? xx
Pass with GSL model? xx Use for PS testing? Y N
Pass Fight Test? xx

20. Name : ss_test_trace.083 No of vectors : 1386
Description : Tests "single step mode"

Portions of Chip Tested : Various

Pass with GFL model? xx
Pass with GSL model? xx Use for PS testing? Y N
Pass Fight Test? xx

21. Name : user_trace.083 No of vectors : 468
Description : Tests all user instructions in user mode.

Portions of Chip Tested : Various

Pass with GFL model? xx
Pass with GSL model? xx Use for PS testing? Y N
Pass Fight Test? xx

9.4. IMS Grouping within limitation? Y N (Required for PS only)
9.5. Tester clock frequency = 10.0 MHz
9.6. Signals that must be glitch free: Y N

	Signal Name	Ran GSL with glitch detection feature on?
1.		Y N
2.		Y N
3.		Y N
4.		Y N
5.		Y N
6.		Y N
7.		Y N
8.		Y N
9.		Y N

10. TIMING ANALYSIS

10.1. System Environment

Temperature Coefficient: 35 Degrees C / Watt (theta JA)
Operating Temp : from 0 ^{0} C (min) to 75 ^{0} C (max)
Operating Voltage : from 4.5 V (min) to 5.5 V (max)
room junction temp = 25 + (theta JA * Power) = 67 degrees C
maximum junction temp = maximum ambient temp + (theta JA * Power) = 117 degrees C

10.2. Reports (Include the following reports)

(required for PS)* guaranteed corner 5.0V room junc temp		(required for PS)* guaranteed corner min operating V max junction temp		typical corner min operating V max junction temp	
Cycle	: xx	Cycle	: xx	Cycle	:
Setup/Hold	: xx	Setup/Hold	: xx	Setup/Hold	:
Output Delay	: xx	Output Delay	: xx	Output Delay	:
Violation	: xx	Violation	: xx	Violation	:

10.3. Timing Setup Files:

Name : basic.040 Listings attached : Yes
Temperature : — Voltage : —
Description : Ouput delays from other chips are specified, as well as IGNORE PATH.
To be used for analysis at all temperatures, voltages, and corners.

Name : baseline.040 Listings attached : Yes
Temperature : 75 Voltage : 5.0
Description : For TYPICAL analysis.

Name : room.040 Listings attached : Yes
Temperature : 67 Voltage : 5.0
Description : For room temp, 5 V, GUARANTEED analysis

Name : worst.040 Listings attached : Yes
Temperature : 117 Voltage : 4.5
Description : For max. temp, 4.5V, GUARANTEED analysis

10.4. Critical Boundary Conditions:

List critical paths here or annotate the timing report.
Attach additional pages if needed.

Clock Name : Clk

	report	limit (+/–5%)	report	limit (+/–5%)
1. Phase 1 High	42.6 ns	50 ns		
2. Phase 2 High	46.3 ns	50 ns		
3. Symmetric Cycle	92.6 ns	100 ns		
4. Minimum Cycle	90.8 ns	100 ns		

Outputs

Signal Name	load (pF)	delay	limit
1. Flush	50	36.4	37.9
2. Freeze	50	27.9	38.3
3. Guard	50	30.9	32.7
4. Ids_eq_ods_1	50	20.3	42.8
5. Ids_eq_ods_2	50	21.0	42.6
6. Ids_freeze	50	23.0	47.4
7. Ods_freeze	50	40.7	47.4
8. Pc[25:0]	50	12.2	15.0
9. RF[31:0]	50	40.5	40.0
10.			
11.			
12.			

Inputs

Signal Name	setup report / limit	hold report / limit
1. RF[31:0] — PHASE_A	2.0 / 5.0	–0.3 / 0.0
2. — PHASE_B	3.1 / 5.0	0.2 / 0.0
3.	/	/
4.	/	/
5.	/	/
6.	/	/
7.	/	/
8.	/	/
9.	/	/

10.5. Hold Time Violations : none (At 2.0 nsec.)

11. DC CHARACTERISTICS

PARA–METERS	DESCRIPTION	CONDITIONS 0 to 70	CONDITIONS –55 to +125	MIN	MAX
DATA PAD INPUT ONLY					
VIH	Input High Voltage			2.0V	
VIL	Input Low Voltage				0.8V
IIL	Input Leakage	VSS<Vin<VDD	VSS<Vin<VDD	–10uA	10uA
CIN	Input Capacitance				6.0pf
DATA PAD OUTPUT ONLY					
VOH	Output High Voltage	VDD= 4.5V IOH=–2.2	VDD= 4.5V IOH=–2mA	2.4V	
VOL	Output Low Voltage	VDD= 4.5V IOL= 6mA	VDD= 4.5V IOL= 5mA		0.4V
IOZ	Output Leakage current(high Z)	VSS<Vout<VDD	VSS<Vout<VDD	–10uA	10uA
COUT	Output Capacitance				7.0pf
DATA PAD INPUT/OUTPUT					
VOH	Output High Voltage	VDD= 4.5V IOH=–2.2	VDD= 4.5V IOH=–2mA	2.4V	
VOL	Output Low Voltage	VDD= 4.5V IOL= 6mA	VDD= 4.5V IOL= 5mA		0.4V
VIH	Input High Voltage			2.0V	
VIL	Input Low Voltage				0.8V
IOZ	Output leakage current (high Z)	VSS<Vout<VDD	VSS<Vout<VDD	–10uA	10uA
CIO	Input/Output Capacitance				7.0pf
CLOCK PAD					
VIH	Input High Voltage			3.9V	
VIL	Input Low Voltage				0.6V
IIL	Input Leakage	VSS<Vin<VDD	VSS<Vin<VDD	–10uA	10uA
CIN	Input Capacitance				15pf

NOTE: All parameters at a supply voltage of VDD = 5V (+/– 10%).

12. CUSTOMER COMMENTS

Pre–Verification Comments

1. tnet reports some "undriven nets". These are correct, and do not represent an actual error.

2. Genesil's Padring CCC flags bond angle, bond length, and wire crossing problems. A copy of the bonding diagram has been sent to HP for approval.

Post–Verification Comments

1. Power and ground routing forced extensive re–routing of the entire chip. The placement of core power and ground pins confused the router and made the route larger.

2. Die Size is now approximately 411 by 427 mils.

3. Genesil flagged bonding angle, length, and wire crossing problems. HP as checked the bonding and found it acceptable for prototype purposes.

4. pc_gen_mod/bradr_pla grew enormously when re–compiled. Steps were taken to get it back to original size since the size increase affected the entire die size.

13. CUSTOMER APPROVAL

The undersigned understands that if any design changes are initiated by the Customer subsequent to this sign–off, the Customer is liable for any charges imposed by Silicon Compiler Systems as agreed to in either the Design Verification Terms & Conditions or the Prototype Services Terms & Conditions. In addition, such changes require the DV process to be started from the beginning, which results in extended DV schedules.

Customer Approval : _____ Date ___/___/_____

Title : _____

14. SCS APPROVAL

Pre–Verification Comments

_____

_____

_____

_____

SCS Approval : _____ Date ___/___/___
Regional Field Application Consultant

SCS Approval : _____ Date ___/___/___
Technical Support Team Leader